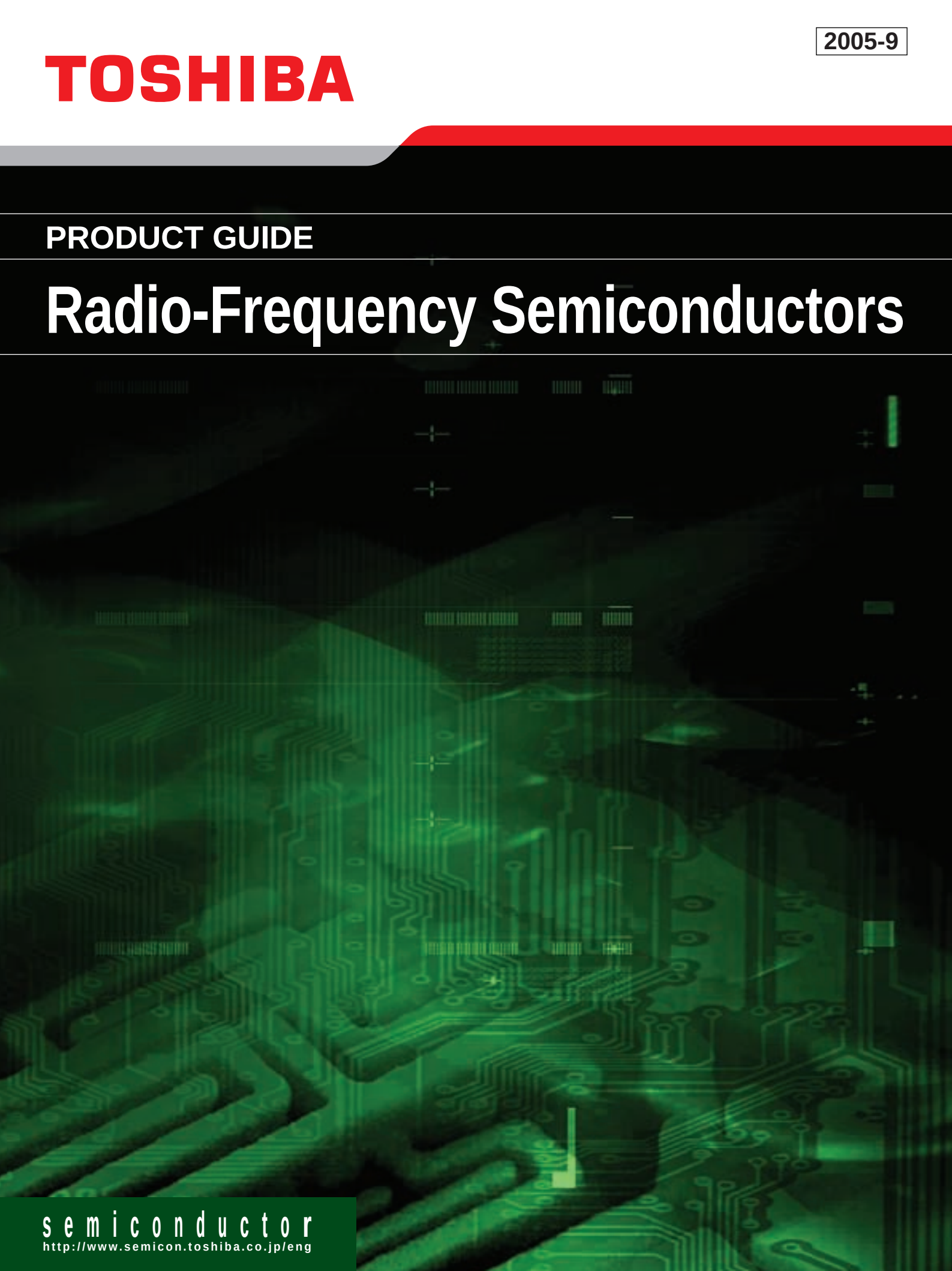
TOSHIBA

2005-9

PRODUCT GUIDE

Radio-Frequency Semiconductors



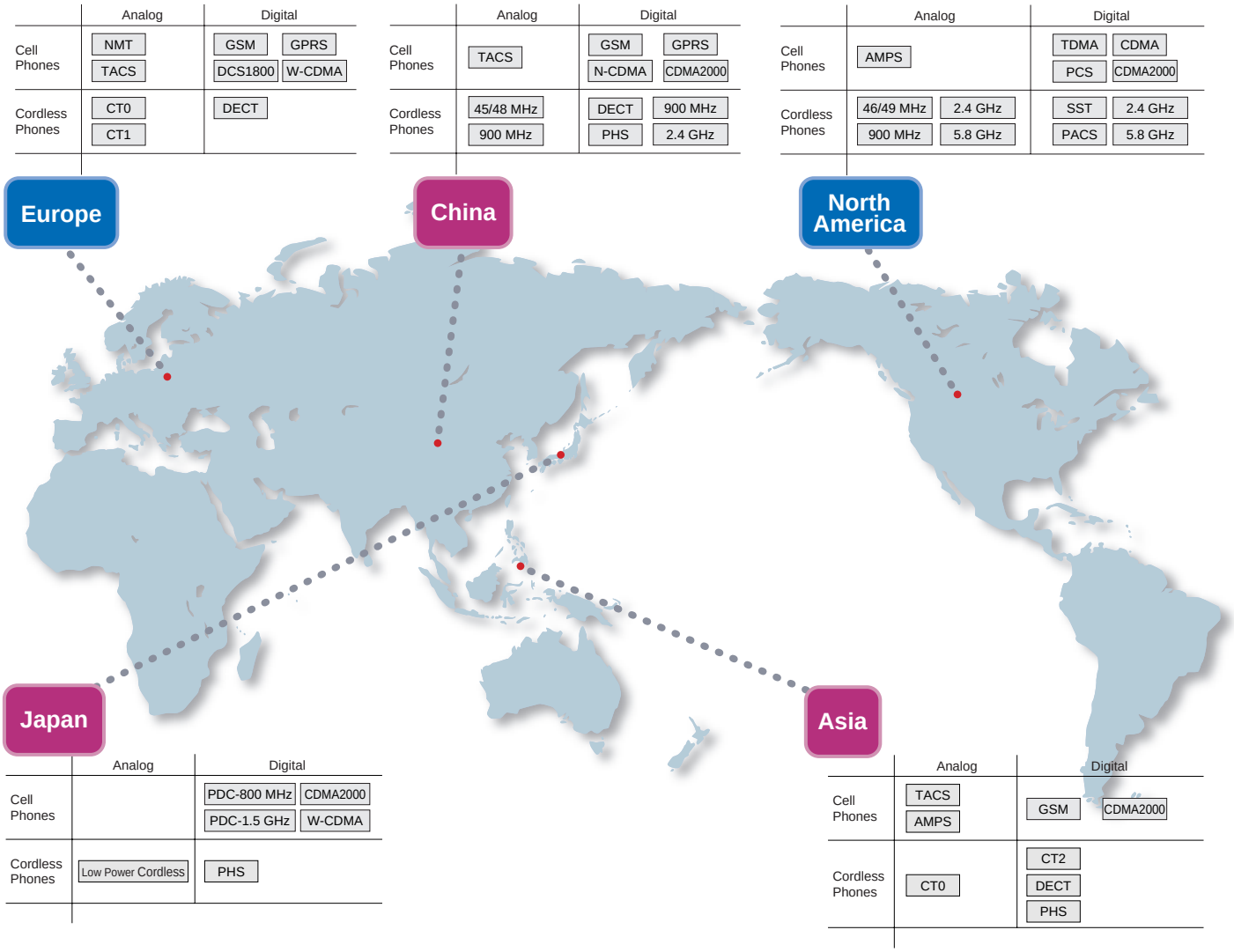
semiconductor
http://www.semicon.toshiba.co.jp/eng

Radio-Frequency Semiconductor Devices

Thank you for using Toshiba's semiconductor devices. As you know, semiconductor products are widely used in both home and industrial applications. This catalog covers transistors, diodes and cell packs housed in small packages designed for mobile communications equipment. For details, please see the individual technical datasheets.

CONTENTS

Mobile Communications Systems of the World



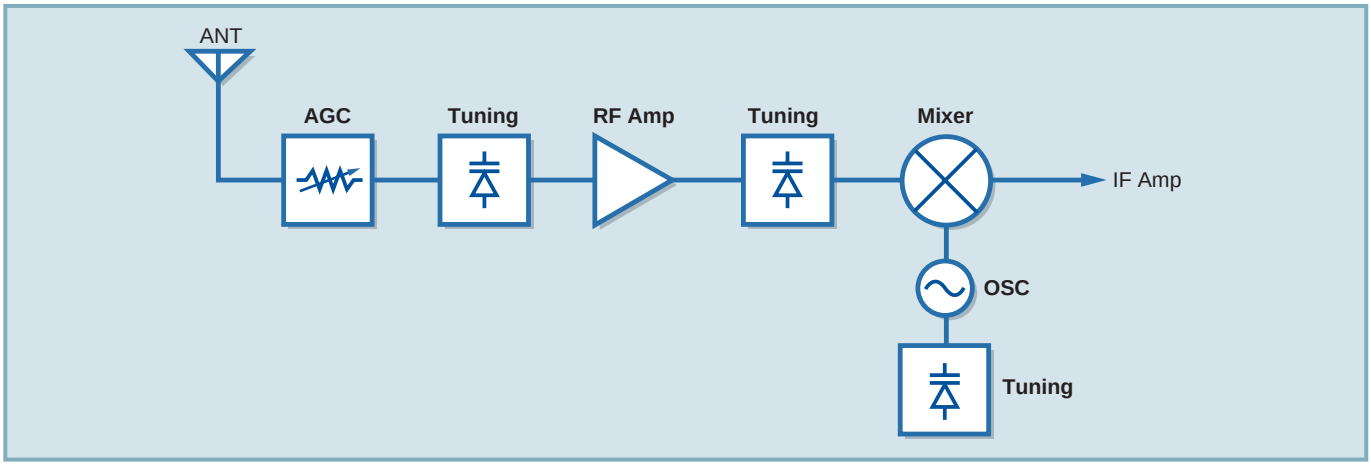
Cell Phone Technologies

1G (Analog) → 2G (Digital) → 3G (Multimedia Digital) → IMT-2000

Cordless Phone Technologies

	AMPS	GSM	PDC 900 MHz 1.5 GHz	TDMA (IS-136)	CDMA (IS-95)	MC-CDMA (US solution)	W-CDMA (Japan/Europesolution)	PHS	DECT
Frequency	TX: 824-849 RX: 869-894	TX: 880-915 RX: 925-960	TX: 940-960 1477-1501 RX: 810-830 1429-1453	TX: 824-849 RX: 869-894	TX: 824-849 RX: 869-894 J-CDMA TX: 887-925 RX: 832-870	2-GHz band	2-GHz band TX: 1920-1980 RX: 2110-2170	1895-1918	1880-1900
Multiple Access Method	FDMA	TDMA	TDMA	TDMA	CDMA	CDMA	CDMA	TDMA	TDMA
Duplex Method	FDD	FDD	FDD	FDD	FDD	FDD	FDD	TDD	TDD
Modulation	FM	GMSK	π/4DQPSK	π/4DQPSK	TX: QPSK RX: OQPSK	TX: HPSK RX: QPSK	TX: HPSK RX: QPSK	π/4DQPSK	GFSK
Speech Coding		RPE-LTP	PSI-CELP VSELP	VSELP	Variable rate QCELP			ADPCM	ADPCM
Channel Spacing	30 kHz	200 kHz (Interleaved)	25 kHz (Interleaved)	30 kHz (Interleaved)	1.25 MHz	5 MHz (1.25 MHz X 3)	5 MHz	300 kHz	1728 kHz
Output Power		Up to 2 W (Class 4)	Up to 800 mW (Portable Type)	Up to 600 mW (Class 3/4)	200 mW to 1 W (Portable Type)		Up to 250 mW (Portable Type)	10 mW (Average) 100 mW (Peak)	10 mW (Average) 250 mW (Peak)
Data Rate			9.6 kbps		14.4/64 kbps	384 kbps	384 kbps	32/64/128 kbps	
Channels Per Carrier		8	6 (Half rate) 3 (Full rate)	3				4	12

1-1 Radio-Frequency Devices for AM Tuners



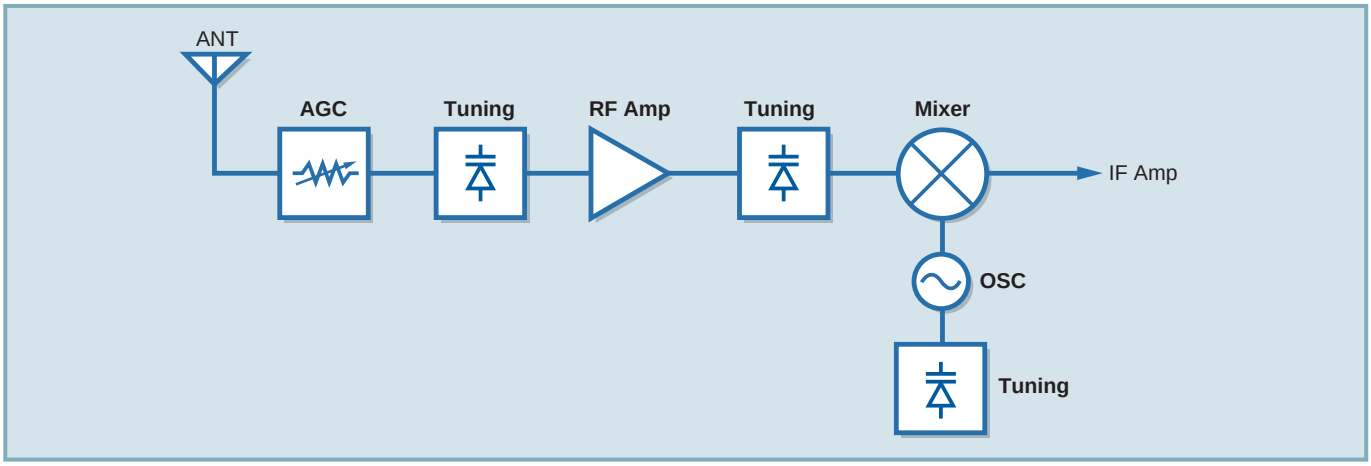
Application	Type		Package	Part Number
AGC	PIN diode	Single	S-MINI	1SV128
			USC	1SV271 1SV307
			ESC	1SV308 JDP2S01E JDP2S04E
		Dual	S-MINI	1SV172
			SMQ	1SV237
			USM	1SV252
			USQ	1SV312 JDP4P02U

Application	Type	Package	Part Number
AGC	Bipolar transistor	MINI	2SC2458
		S-MINI	2SC2712
RF Amp	JFET	TO-92	2SK709
		MINI	2SK710
		S-MINI	2SK711
		USM	2SK1875
	Dual transistor	SMV	HN3G01J

Application	Type	Package	Part Number
Tuning	Tuning varicap diode	MINI	1SV102 1SV149-B
		FM8	HN1V01H HN1V02H HN2V02H

Application	Type	Package	Part Number
Mixer	Bipolar transistor	TO-92	2SC380TM 2SC941TM
		MINI	2SC2669 2SC2670
		S-MINI	2SC2715 2SC2716

1-2 Radio-Frequency Devices for FM Tuners



Application	Type		Package	Part Number
AGC	PIN diode	Single	S-MINI	1SV128
			USC	1SV271 1SV307
			ESC	1SV308 JDP2S01E JDP2S04E
		Dual	S-MINI	1SV172
			SMQ	1SV237
			USM	1SV252
			USQ	1SV312 JDP4P02U
	Schottky diode	Single	USC	1SS315
			fSC	JDH2S01FS
		Dual	S-MINI	1SS295
			SSM	JDH3D01S*
			VESM	JDH3D01FV*

* New product

Application	Type	Package	Part Number
RF Amp	Dual-gate MOSFET	SMQ	3SK195
			3SK225 3SK226
		USQ	3SK257 3SK258
	Single-gate MOSFET	MINI	2SK241
		S-MINI	2SK302
		USM	2SK882
		SMQ	2SK1771
	Bipolar transistor	MINI	2SC2668
		S-MINI	2SC2714
		USM	2SC4215
	JFET	MINI	2SK161 2SK192A
		S-MINI	2SK211 2SK210
		USM	2SK881

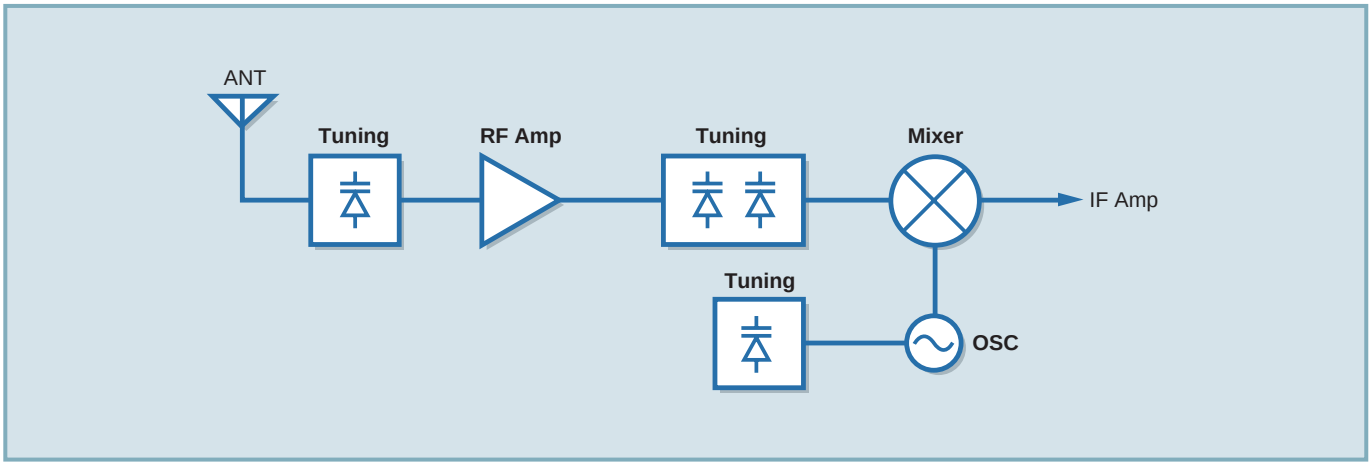
Application	Type		Package	Part Number
Tuning	Tuning varicap diode	Dual	MINI	1SV101
			S-MINI	1SV225 1SV228 JDV3C11 JDV3C34*
	AFC varicap diode	Single	S-MINI	1SV160

* New product

Application	Type	Package	Part Number
Mixer	Dual-gate MOSFET	SMQ	3SK195
		USQ	3SK260
	Bipolar transistor	MINI	2SC2668
		S-MINI	2SC2714
		USM	2SC4215
		SSM	2SC4915

Application	Type	Package	Part Number
OSC	JFET	MINI	2SK192A
		S-MINI	2SK210
	Bipolar transistor	MINI	2SC2668 2SC2995
		S-MINI	2SC2714 2SC2996
		USM	2SC4215
		SSM	2SC4915

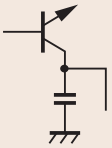
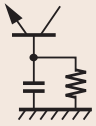
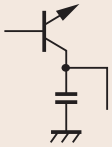
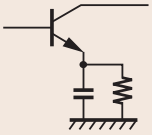
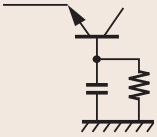
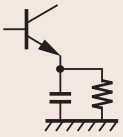
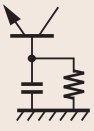
1-3 Radio-Frequency Devices for TV and VCR Tuners



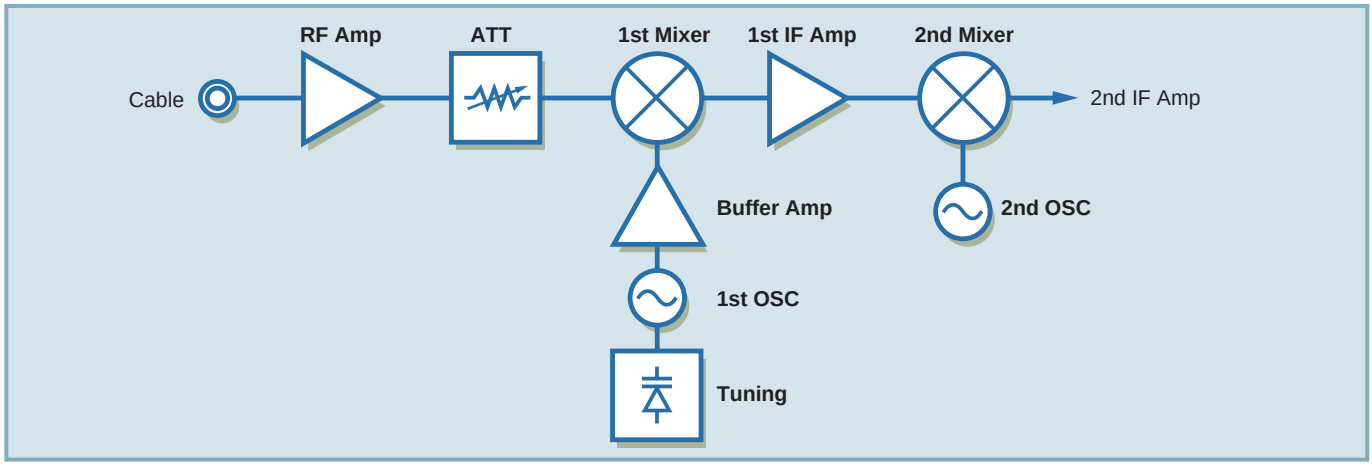
Application	Type	Band	Package	Part Number
Tuning	Tuning varicap diode	Wideband VHF	USC	1SV215 1SV262 1SV288 1SV231 1SV232 1SV269 1SV302
			ESC	1SV282 1SV290B 1SV283B 1SV303
			S-MINI (dual type)	1SV242
		UHF	USC	1SV214
			ESC	1SV278B
	AFC diode	VHF to UHF	USC	1SV216
RF Amp	Dual-gate FET	Wideband VHF	SMQ	3SK195 3SK225 3SK226 3SK292
			USQ	3SK259 3SK257 3SK258 3SK294
		UHF	SMQ	3SK199 3SK207 3SK232 3SK291
			USQ	3SK256 3SK249 3SK293
Mixer	Dual-gate FET	VHF and wideband VHF	USQ	3SK260 3SK259
	Schottky diode	UHF	S-MINI	1SS295 (dual)
			USC	1SS315
			SSM	JDH3D01S* (dual)
			fSC	JDH2S01FS
			VESM	JDH3D01FV* (dual)

* New product

Application	Type	Band		Internal Connection	Package	Part Number
Tuning	Band switch	Single	VHF and wideband VHF	———	USC	1SS314
					ESC	1SS381
					sESC	JDS2S03S
		Dual		Common anode 	S-MINI	1SS269
						1SS268
					USM	1SS313
				Common cathode 	USM	1SS312
					SSM	1SS364

Application	Type	Band	Circuit Diagram	Package	Part Number
RF Amp	Bipolar transistor	UHF	 Common base	USM	2SC4244
				SMQ	2SC4214
OSC	Bipolar transistor	Wideband VHF	 Common collector	USM	2SC4251 2SC4246 2SC4252
				S-MINI	2SC3124 2SC3121
		UHF	 Common base	USM	2SC4246
				S-MINI	2SC3121
			 Common collector	USM	2SC4247
				S-MINI	2SC3547A
Mixer	Bipolar transistor	Wideband VHF	 Common emitter	USM	2SC4250 2SC4245
				S-MINI	2SC3123 2SC3120
			 Common base	USM	2SC4253 2SC4251 2SC4246
				S-MINI	2SC3125 2SC3124 2SC3121
		UHF	 Common emitter	S-MINI	2SC3120 2SC3862
				S-MINI	2SC3547A
			 Common base	USM	2SC4245
				USM	2SC4247

1-4 Radio-Frequency Devices for CATV Converters



Application	Type		Package	Part Number
RF Amp	Bipolar transistor		SMQ	2SC5087 2SC5087R* MT4S03A MT4S04A
			USQ	MT4S03AU MT4S04AU MT4S100U MT4S101U MT4S102U* MT4S104U*
			TESQ	MT4S100T MT4S101T MT4S102T* MT4S104T*
ATT	PIN diode	Single	S-MINI	1SV128
			USC	1SV271 1SV307
			ESC	1SV308 JDP2S01E JDP2S04E
		Dual	S-MINI	1SV172
			SMQ	1SV237
			USM	1SV252
			USQ	1SV312 JDP4P02U
			TESQ	JDP4P02AT
1st Mixer	Schottky diode	Single	S-MINI	1SS154
			fSC	JDH2S01FS
		Dual	S-MINI	1SS271
			SSM	JDH3D01S*
			VESM	JDH3D01FV*
1st IF Amp	Bipolar transistor		S-MINI	MT3S03A MT3S04A
			SMQ	MT4S03A MT4S04A MT4S06 MT4S07
			USQ	MT4S03AU MT4S04AU MT4S06U MT4S07U
	Si dual-gate MOSFET		SMQ	3SK199 3SK232 3SK291 3SK292
			USQ	3SK249 3SK293 3SK294

* New product

Application	Type	Package	Part Number
2nd Mixer	Schottky diode	S-MINI	1SS154(single) 1SS271(dual)
	Si dual-gate MOSFET	SMQ	3SK199 3SK232 3SK291
		USQ	3SK249 3SK293
	Cell pack	SM8	TA4107F

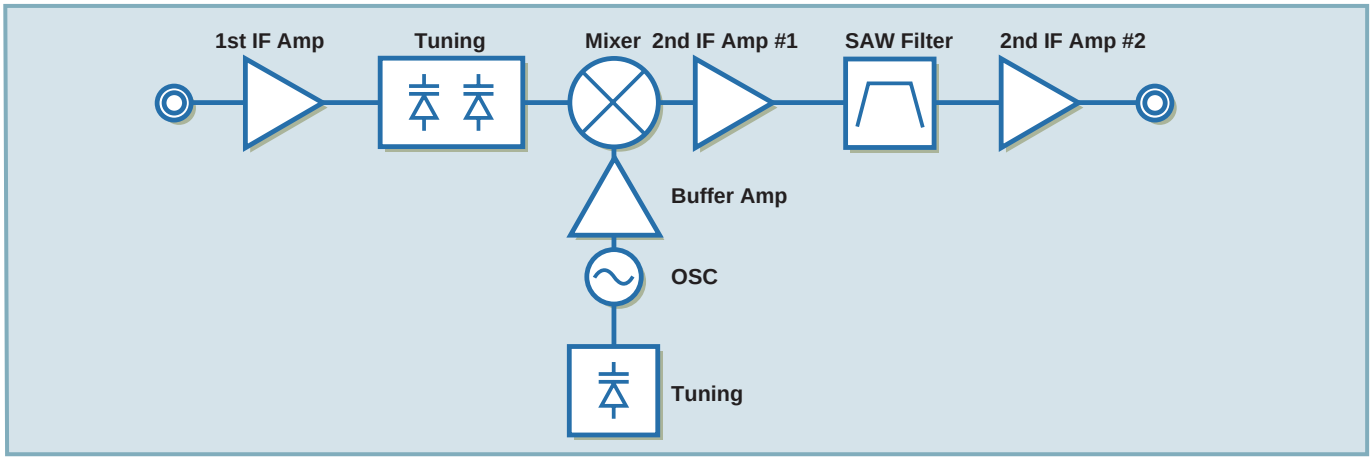
Application	Type	Package	Part Number
Buffer Amp	Bipolar transistor	S-MINI	MT3S03A MT3S04A
		SMQ	MT4S03A MT4S04A MT4S06 MT4S07
		USQ	MT4S03AU MT4S04AU MT4S06U MT4S07U

Application	Type	Package	Part Number
1st OSC	Bipolar transistor	S-MINI	2SC5084 MT3S03A MT3S04A
		USM	MT3S03AU MT3S04AU

Application	Type	Package	Part Number
Tuning	Tuning varicap diode	USC	1SV214 1SV230
		ESC	1SV278B

Application	Type	Package	Part Number
2nd OSC	Bipolar transistor	USM	2SC4246
		S-MINI	2SC3121

1-5 Radio-Frequency Devices for SHF 2nd Converters



Application	Type	Package	Part Number
1st IF Amp	Bipolar transistor	SMQ	MT4S03A MT4S04A MT4S06 MT4S07 2SC5092
		USQ	2SC5088 2SC5093 2SC5319 MT4S06U MT4S07U MT4S100U MT4S101U MT4S102U* MT4S104U*
		TESQ	MT4S100T MT4S101T MT4S102T* MT4S104T*

* New product

Application	Type	Package	Part Number
Tuning	Preselector and tuning varicap diode	USC	1SV245 1SV287 JDV2S71U
		ESC	1SV309 1SV291 JDV2S71E

Application	Type	Package	Part Number
Mixer	Bipolar transistor	SMQ	2SC5092
	Schottky diode	S-MINI	1SS154 (single) 1SS271 (dual)
		SSM	JDH3D01S* (dual)
		fSC	JDH2S01FS
		VESM	JDH3D01FV* (dual)
	Cell pack	SM8	TA4107F

* New product

Application	Type	Package	Part Number
2nd IF Amp #1	Cell pack	SMQ	TA4002F

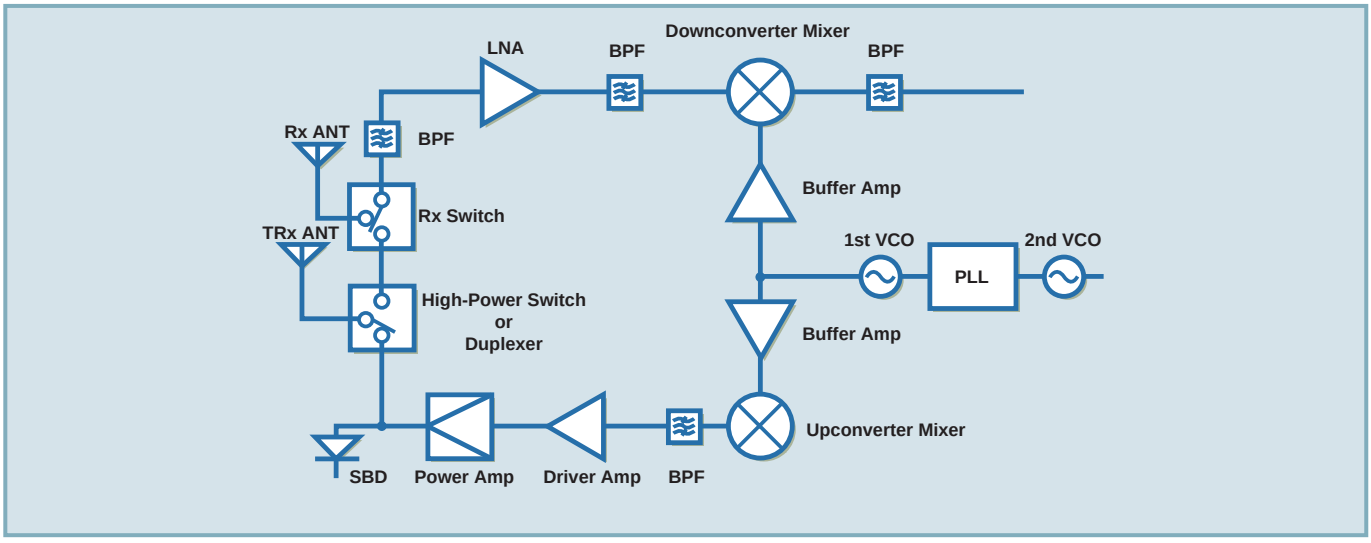
Application	Type	Package	Part Number
2nd IF Amp #2	Cell pack	SM6	TA4000F
		TU6	TA4017FT
		SM8	TA4018F TA4019F

Application	Type	Package	Part Number
Buffer Amp	Bipolar transistor	USQ	2SC5088 2SC5093 2SC5319

Application	Type	Package	Part Number
OSC	Bipolar transistor	S-MINI	2SC5089
		USQ	MT4S200U*

* New product

1-6 Radio-Frequency Devices for 800-MHz Analog and Digital Cell Phones



Application	Type	Package	Part Number
Power Amp	Si MOSFET	PW-MINI	2SK2854
			2SK2855

Application	Type	Package	Part Number
Rx Switch	GaAs MMIC	TU6	TG2210FT TG2211AFT*
		sES6	TG2213S TG2214S
		CST6B	TG2217CTB*
	PIN diode	fSC	JDP2S02AFS JDP2S05FS
		CST2	JDP2S02ACT JDP2S05CT
		SC2	JDP2S08SC
	Band switch	sESC	JDS2S03S

* New product

Application	Type	Package	Part Number
Buff Amp	Si cell pack	ESV	TA4011AFE
			TA4012AFE

Application \ Package / Type		USC	fSC	SSM	VESM
Detector	SBD	ISS315	JDH2S01FS	JDH3D01S	JDH3D01FV*

* New product/Dual

Varicap Diodes

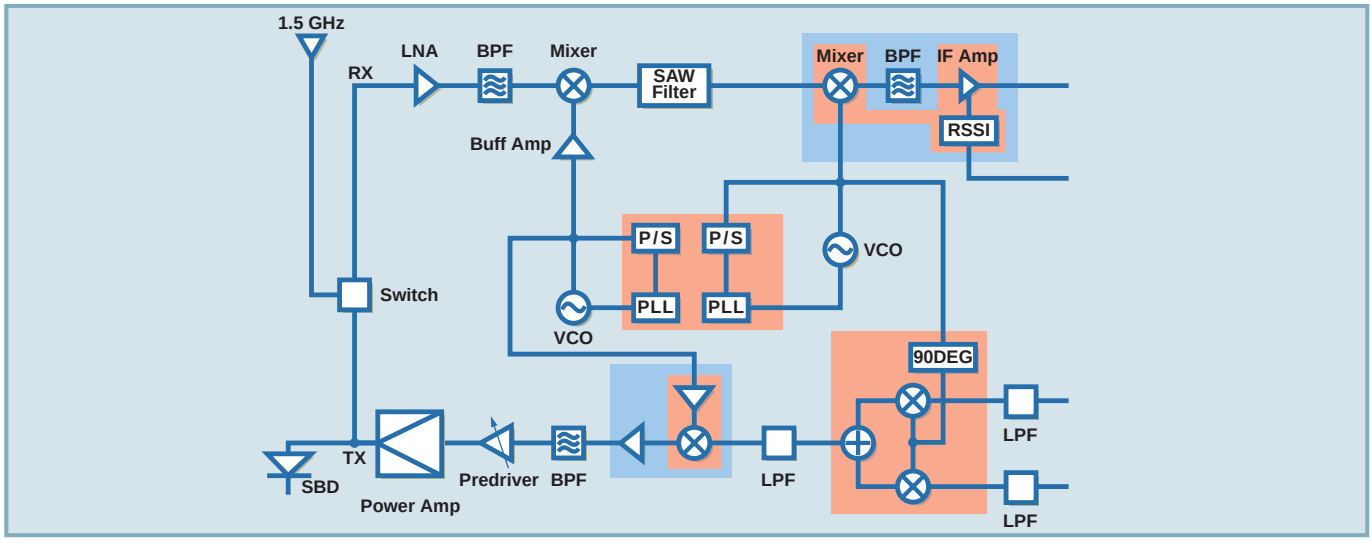
Application \ Package / Type		USC	ESC	sESC	fSC	CST3	SC2
VCO	VCD	1SV229 1SV270 1SV276 1SV304 1SV310	1SV279 1SV281 1SV284 1SV305 1SV311	JDV2S06S JDV2S08S JDV2S09S	JDV2S06FS JDV2S08FS JDV2S09FS JDV2S26FS* JDV2S27FS* JDV2S28FS*	JDV3S26CT* JDV3S27CT* JDV3S28CT*	JDV2S26SC* JDV2S27SC* JDV2S28SC* JDV2S31SC*

* New product

Application	Package Type	TESM	fSM	SMQ	USQ	fS6	CST3	CST6
LNA, Buff Amp	Bipolar transistor	2SC5066FT 2SC5086FT 2SC5091FT 2SC5096FT MT3S03AT MT3S06T MT3S07T MT3S14T MT3S18T MT3S35T MT3S36T MT3S37T MT3S41T	MT3S03AFS MT3S06FS MT3S07FS MT3S14FS* MT3S18FS* MT3S35FS MT3S36FS MT3S37FS MT3S41FS	2SC5087 2SC5092 2SC5097 MT4S06 MT4S07	2SC5088 2SC5093 2SC5098 MT4S06U MT4S07U MT4S32U			
Mixer	Bipolar transistor	2SC5066FT 2SC5086FT 2SC5108FT 2SC5111FT		2SC5087	2SC5088			
VCO	Bipolar transistor	2SC5086FT 2SC5464FT 2SC5066FT 2SC5108FT 2SC5111FT MT3S03AT MT3S04AT MT3S05T MT3S06T MT3S07T MT3S08T MT3S11T MT3S12T MT3S14T MT3S18T MT3S35T MT3S36T MT3S37T MT3S41T MT3S45T	MT3S03AFS MT3S04AFS MT3S05FS MT3S06FS MT3S07FS MT3S08FS MT3S11FS MT3S14FS MT3S18FS MT3S35FS MT3S36FS MT3S37FS MT3S41FS MT3S45FS MT3S106FS* MT3S107FS*			MT6L63FS MT6L64FS MT6L65FS MT6L66FS* MT6L67FS* MT6L68FS MT6L71FS MT6L72FS MT6L73FS* MT6L74FS* MT6L75FS* MT6L76FS* MT6L77FS* MT6L78FS	MT3S11CT* MT3S106CT*	MT6L66CT* MT6L67CT* MT6L73CT* MT6L74CT* MT6L75CT* MT6L76CT* MT6L77CT*

* New product

1-7 Radio-Frequency Devices for PDC Phones (1.5 GHz)



Application \ Package Type	ESC	sESC	fSC	CST3	SC2
VCO / VCD	JDV2S05E 1SV285 1SV305 1SV311 1SV314 1SV329	JDV2S05S JDV2S07S JDV2S08S JDV2S09S JDV2S10S JDV2S13S	JDV2S05FS JDV2S07FS JDV2S08FS JDV2S09FS JDV2S10FS JDV2S13FS JDV2S25FS* JDV2S26FS* JDV2S27FS* JDV2S28FS*	JDV2S25CT* JDV2S26CT* JDV2S27CT* JDV2S28CT*	JDV2S25SC* JDV2S26SC* JDV2S27SC* JDV2S28SC* JDV2S31SC*

* New product

Application \ Package Type	ESV
Buff Amp / Si cell pack	TA4011AFE TA4012AFE

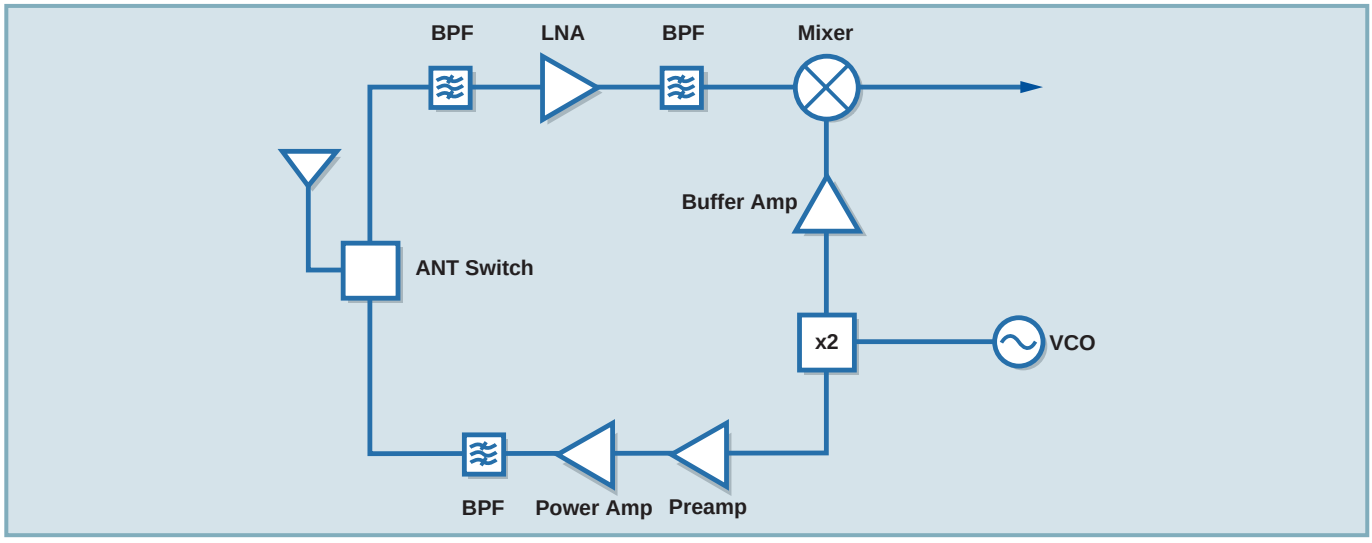
Application \ Package Type	USC	fSC	SSM	VESM
Detector / SBD	1SS315	JDH2S01FS	JDH3D01S	JDH3D01FV*

* New product/Dual

Application \ Package Type	TESM	fSM	USQ	TESQ	fS6	CST3	CST6
LNA Buff Amp (Bipolar transistor)	2SC5317FT MT3S03AT MT3S06T MT3S07T MT3S14T* MT3S18T* MT3S35T MT3S36T MT3S37T MT3S41T	MT3S06FS MT3S07FS MT3S14FS* MT3S18FS* MT3S35FS MT3S36FS MT3S37FS MT3S41FS	2SC5319 MT4S06U MT4S07U MT4S100U MT4S101U	MT4S100T MT4S101T			
Mixer (downconv.) (Bipolar transistor)	2SC5317FT 2SC5086FT						
VCO (Bipolar transistor)	MT3S03AT MT3S04AT MT3S05T MT3S06T MT3S07T MT3S08T MT3S11T MT3S12T MT3S14T MT3S18T MT3S35T MT3S36T MT3S37T MT3S41T MT3S45T	MT3S03AFS MT3S04AFS MT3S05FS MT3S06FS MT3S07FS MT3S08FS MT3S11FS MT3S12FS MT3S14FS MT3S18FS MT3S35FS MT3S36FS MT3S37FS MT3S41FS MT3S45FS MT3S106FS* MT3S107FS*			MT6L63FS MT6L64FS MT6L65FS MT6L66FS* MT6L67FS* MT6L68FS MT6L71FS MT6L72FS MT6L73FS* MT6L74FS* MT6L75FS* MT6L76FS* MT6L77FS* MT6L78FS	MT3S11CT* MT3S106CT*	MT6L66CT* MT6L67CT* MT6L73CT* MT6L74CT* MT6L75CT* MT6L76CT* MT6L77CT*

* New product

1-8 Radio-Frequency Devices for 900-MHz, 2.4-GHz and 5.8-GHz Cordless Phones



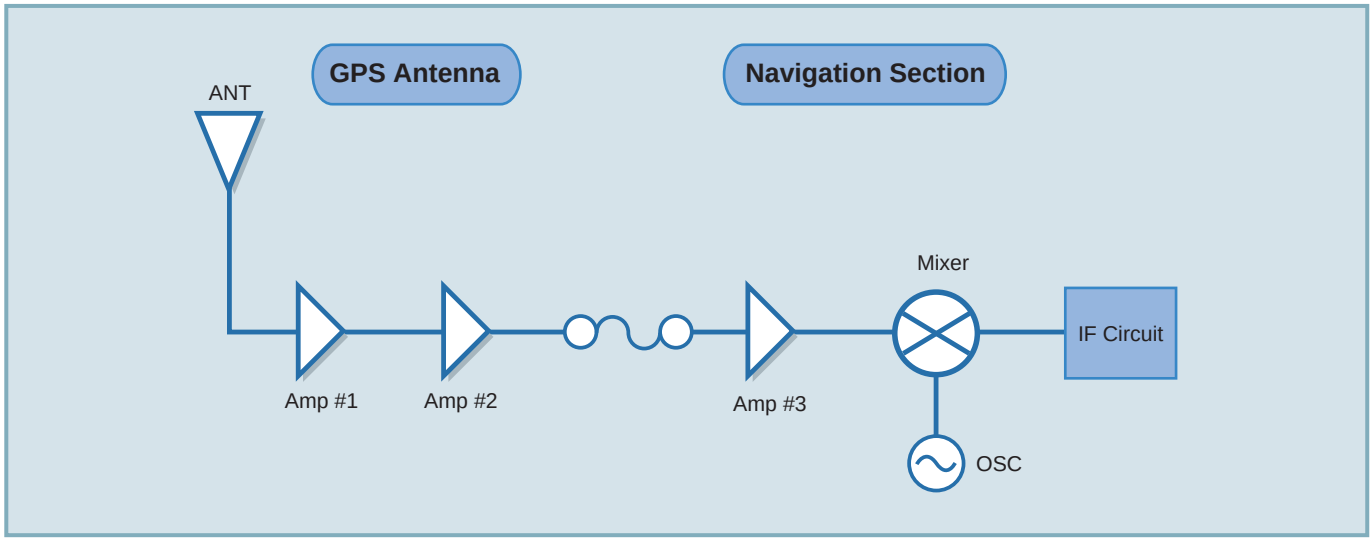
Application	Type	USC	ESC	sESC	fSC	CST2	SC2
ANT Switch	900 MHz	1SV271 1SV307 1SS314	JDP2S04E 1SV308 1SS381	JDP2S02AS JDS2S03S	JDP2S02AFS	JDP2S02ACT	JDP2S08SC
	2.4 GHz	1SV271 1SV307	JDP2S04E 1SV308	JDP2S02AS	JDP2S02AFS JDP2S05FS	JDP2S02ACT JDP2S05CT	
	5.8 GHz				JDP2S05FS	JDP2S05CT	
VCO & Varicap Diode	900 MHz	1SV214 1SV229 1SV276 1SV304 1SV310 1SV313	1SV278B 1SV279 1SV284 1SV305 1SV311 1SV314	JDV2S06S JDV2S08S JDV2S09S JDV2S10S	JDV2S06FS JDV2S08FS JDV2S09FS JDV2S10FS		
	2.4 GHz		JDV2S01E JDV2S02E JDV2S05E	JDV2S01S JDV2S02S JDV2S05S JDV2S16S JDV2S19S	JDV2S01FS JDV2S02FS JDV2S05FS JDV2S16FS JDV2S19FS		
	5.8 GHz		JDV2S02E	JDV2S02S JDV2S17S* JDV2S22S*	JDV2S02FS JDV2S17FS* JDV2S22FS*		

* New product

Application	Type	USM	SSM	TESM	SMQ	USQ	TESQ
VCO Buffer Amp Mixer Power Amp Preamp LNA	900 MHz	2SC5065 2SC5085 MT3S06U MT3S16U*	2SC5066 2SC5086 MT3S06S	2SC5066FT 2SC5086FT MT3S06T MT3S16T* MT3S18T*	2SC5087 MT4S06	2SC5088 MT4S06U	
	2.4 GHz	MT3S06U	MT3S06S	2SC5317FT MT3S06T MT3S18T* MT3S35T MT3S37T MT3S45T	MT4S06	2SC5319 MT4S06U MT4S101U MT4S32U	MT4S101T
	5.8 GHz			MT3S35T MT3S37T		MT4S100U MT4S101U MT4S102U MT4S104U MT4S200U*	MT4S100T MT4S101T MT4S102T MT4S104T

* New product

1-9 Radio-Frequency Devices for Global Positioning Systems (GPS)



GPS Antenna Section

Application \ Package	Type	ES6	USQ	TESQ
Amp #2	Bipolar transistor		2SC5319 MT4S32U MT4S100U MT4S101U MT4S102U MT4S104U MT4S200U*	MT4S100T MT4S101T MT4S102T MT4S104T
	Si cell pack	TA4016AFE		TA4020FT*

* New product

Navigation Section

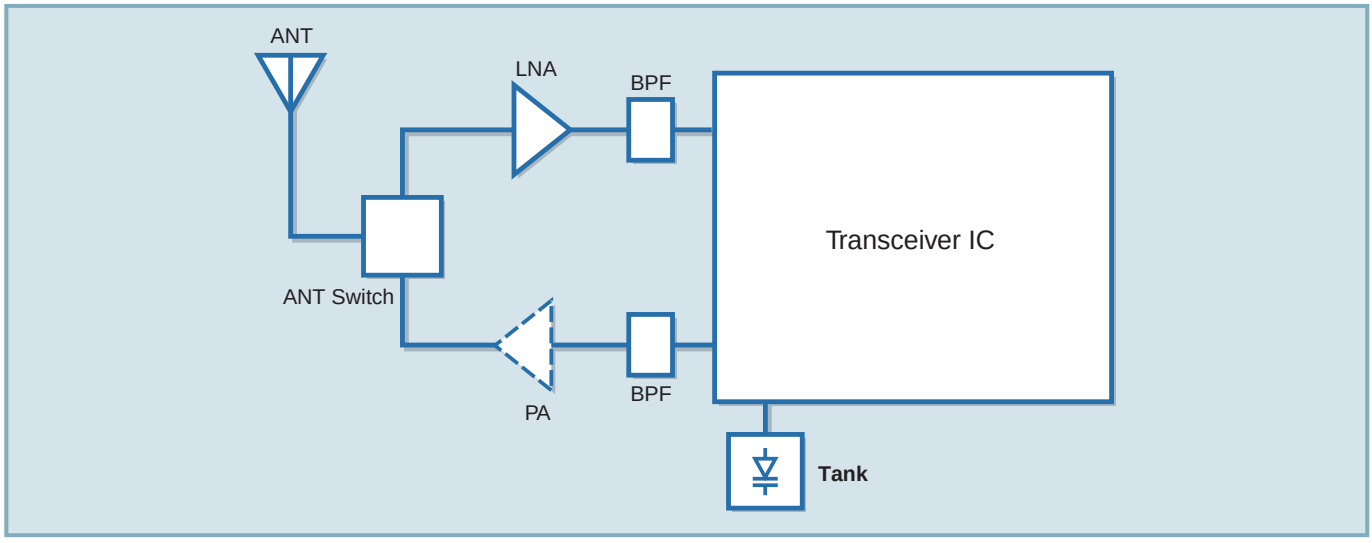
Application \ Package	Type	USQ	TESQ
Amp #3	Bipolar transistor	2SC5319 MT4S06U MT4S32U MT4S100U MT4S101U MT4S102U* MT4S104U*	MT4S100T MT4S101T MT4S102T* MT4S104T*
Mixer OSC	Bipolar transistor	2SC5319 MT4S06U	

* New product

Application \ Package	Type	ESC	sESC	fSC
OSC	Varicap diode	1SV314 1SV329 JDV2S01E JDV2S02E JDV2S05E	JDV2S10S JDV2S13S JDV2S01S JDV2S02S JDV2S05S JDV2S16S JDV2S17S* JDV2S19S JDV2S22S*	JDV2S10FS JDV2S13FS JDV2S01FS JDV2S02FS JDV2S05FS JDV2S16FS JDV2S17FS* JDV2S19FS JDV2S22FS*

* New product

1-10 2.4-GHz Wireless LAN and Bluetooth™



ANT Switches

Application	Type	Package	Comment
ANT Switch for 2.4G WLAN and Class-1 BT	GaAs MMIC	UF6	TG2216TU
ANT Switch for Class-2/3 BT		TU6	TG2210FT TG2211AFT*
		sES6	TG2213S TG2214S
		CST6B	TG2217CTB*

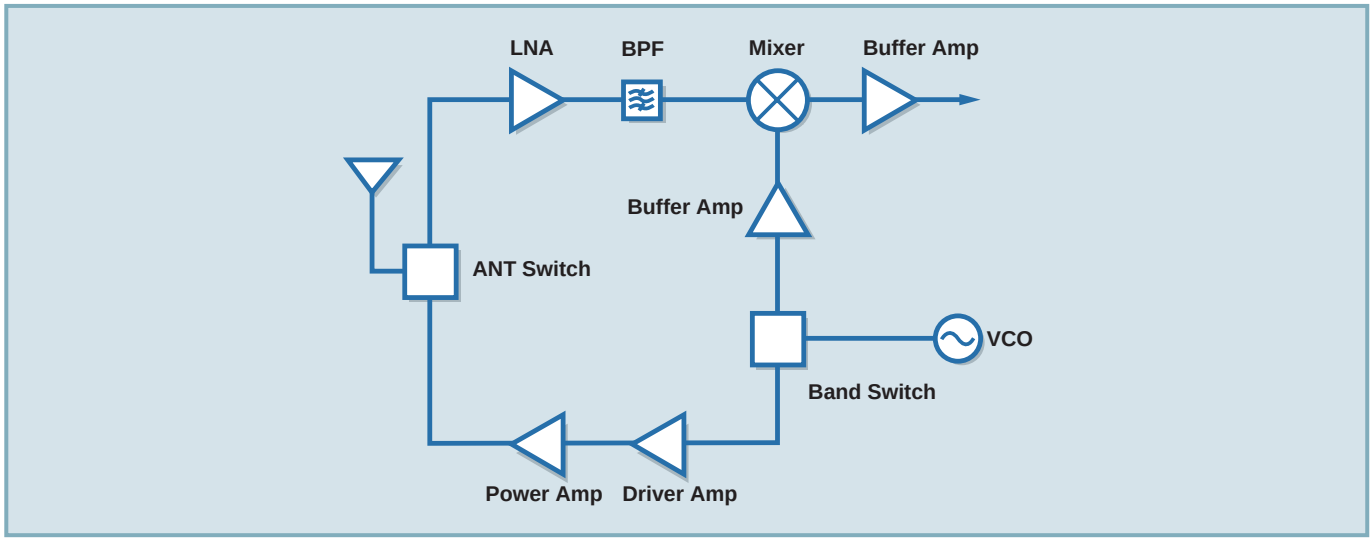
* New product

Application \ Package / Type		USQ	TESQ
LNA	Bipolar transistor	MT4S100U MT4S101U MT4S102U MT4S104U	MT4S100T MT4S101T MT4S102T MT4S104T

Application \ Package / Type		ESC	sESC	fSC
VCO	Varicap diode	1SV314 1SV329 JDV2S01E JDV2S02E JDV2S05E	JDV2S10S JDV2S13S JDV2S01S JDV2S02S JDV2S05S JDV2S16S JDV2S19S	JDV2S10FS JDV2S13FS JDV2S01FS JDV2S02FS JDV2S05FS JDV2S16FS JDV2S19FS

* Bluetooth™ is a trademark owned Bluetooth SIG, Inc.

1-11 Radio-Frequency Devices for FRS and GMRS



Application \ Package	Type	USC	ESC	sESC	fSC	CST2	SC2	USM	SSM	TESM	SMQ	USQ
ANT Switch	FRS, GMRS	1SS314 1SV271 1SV307	1SS381 JDP2S04E 1SV308	JDS2S03S JDP2S02AS	JDP2S02AFS JDP2S05FS	JDP2S02ACT JDP2S05CT	JDP2S08SC					
VCO		1SV214 1SV229 1SV276 1SV304	1SV278B 1SV279 1SV284 1SV305 1SV282	JDV2S06S JDV2S08S	JDV2S06FS JDV2S08FS							
VCO Driver Amp Buffer Amp Mixer LNA								2SC5065 2SC5085 MT3S06U MT3S16U*	2SC5066 2SC5086 MT3S06S	2SC5066FT 2SC5086FT MT3S06T MT3S16T* MT3S18T*	2SC5087 MT4S06	2SC5088 MT4S06U

* New product

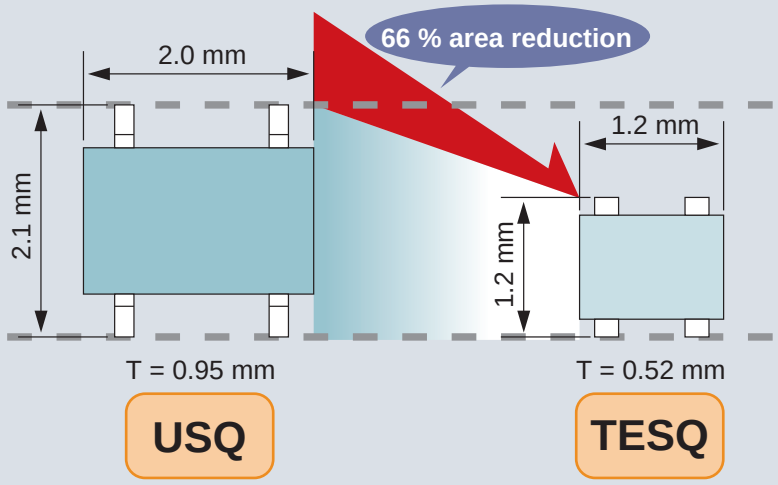
Application \ Package	Type	PW-MINI	PW-X
Power Amp	FRS	2SK3078A 2SK3656*	
	GMRS		2SK3079A 2SK3756*

* New product

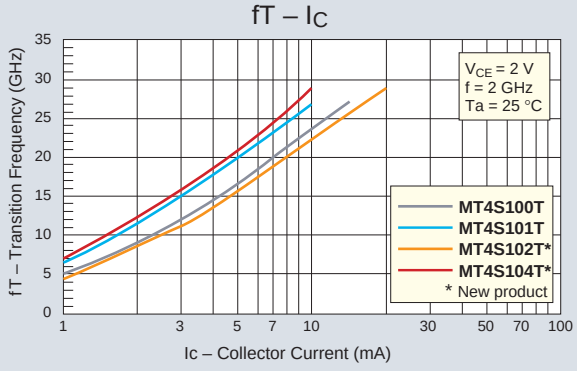
2-1 Microwave Transistors

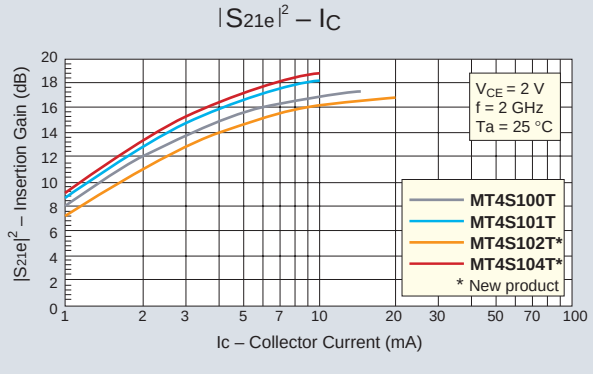
- New silicon-germanium transistors
- Housed in compact USQ and TESQ packages
- Lower noise figure and higher transition frequency

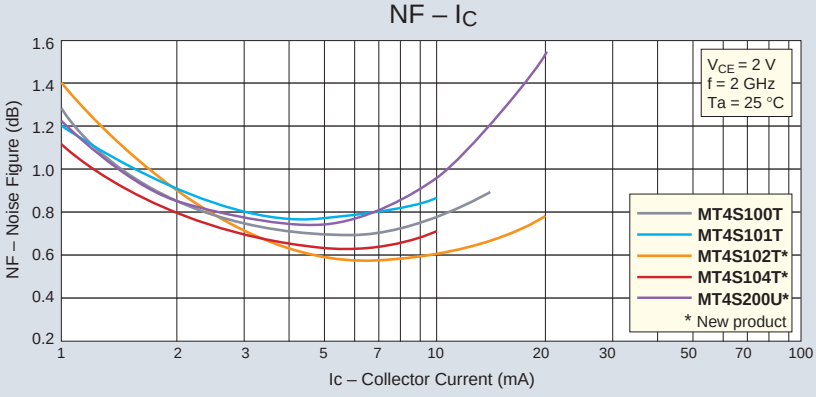
Silicon-Germanium Transistor Package Dimensions



Silicon-Germanium Transistor Characteristics



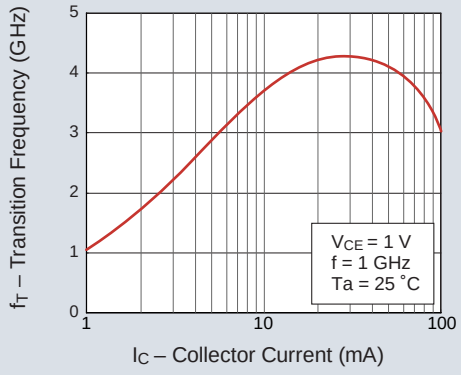




Transistors with fT = 4 GHz

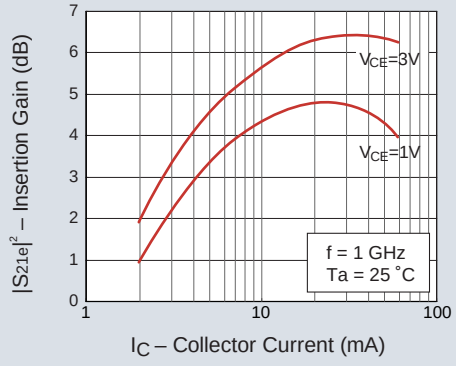
MT3S16FS

$f_T - I_C$



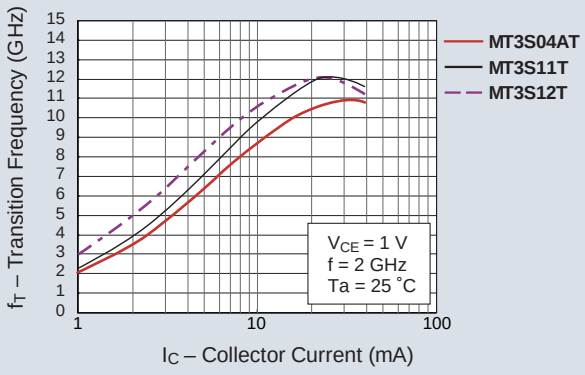
MT3S16FS

$|S_{21e}|^2 - I_C$

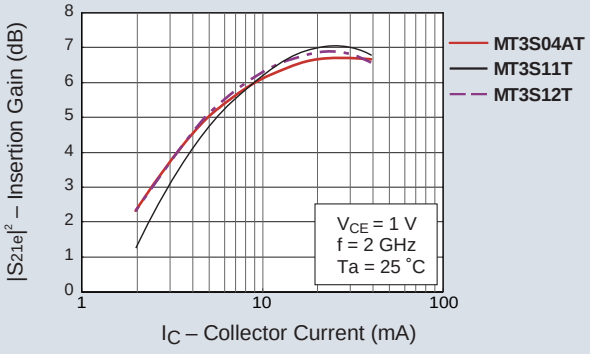


Transistors with fT = 7 GHz

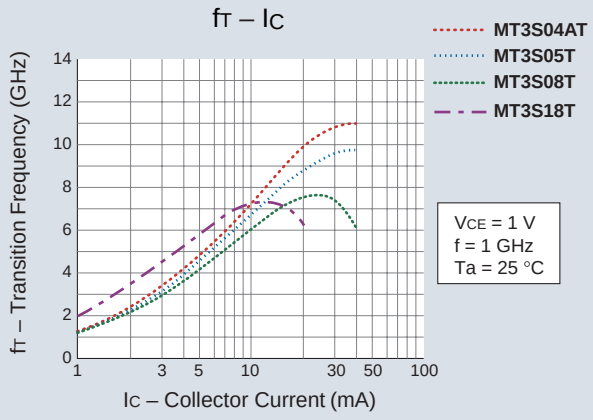
$f_T - I_C$

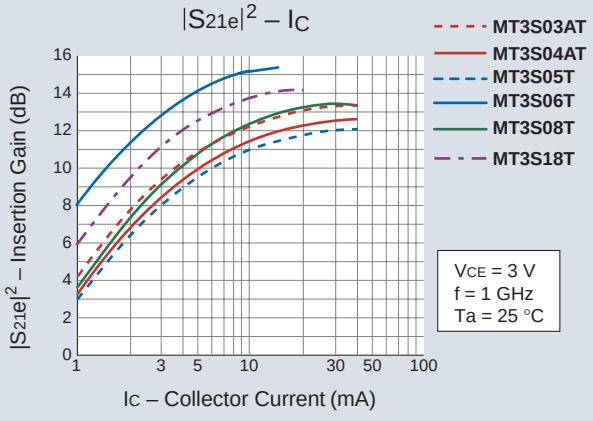


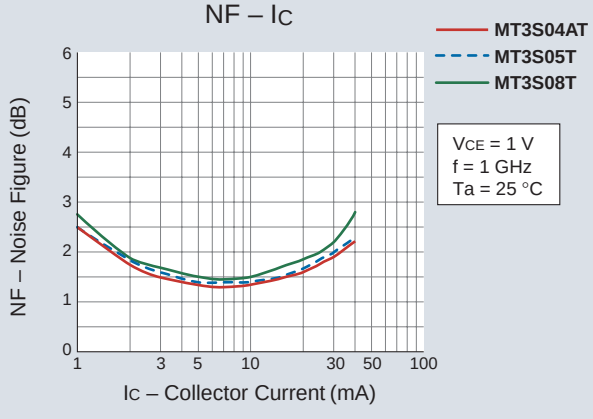
$|S_{21e}|^2 - I_C$



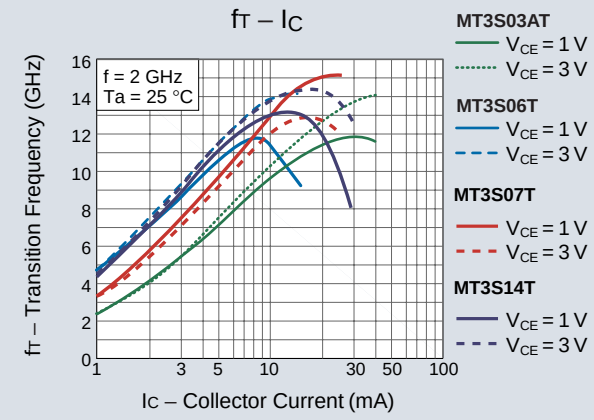
Transistors with fT = 7 to 10 GHz

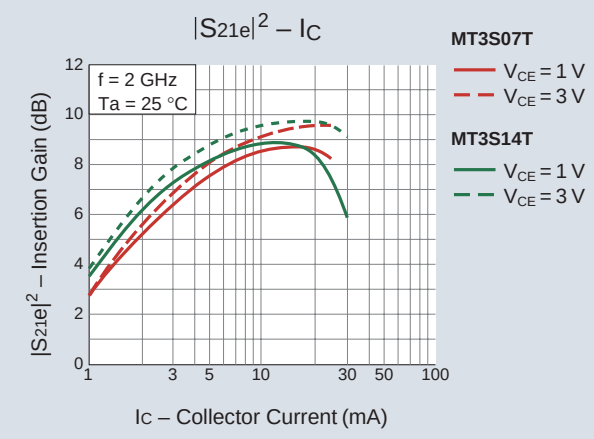


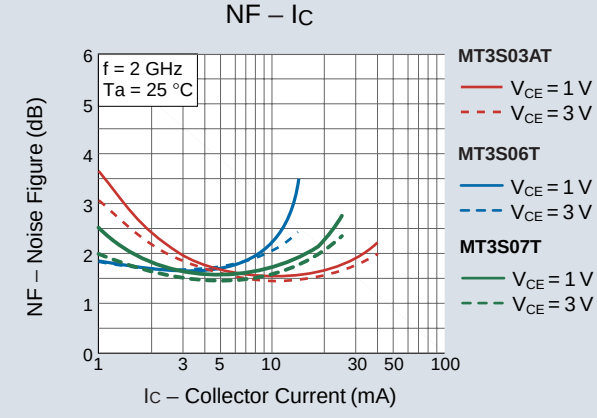




Transistors with fT = 10 to 12 GHz



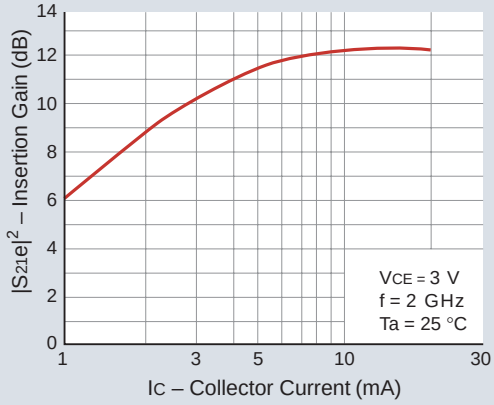




Transistors with fT = 16 GHz

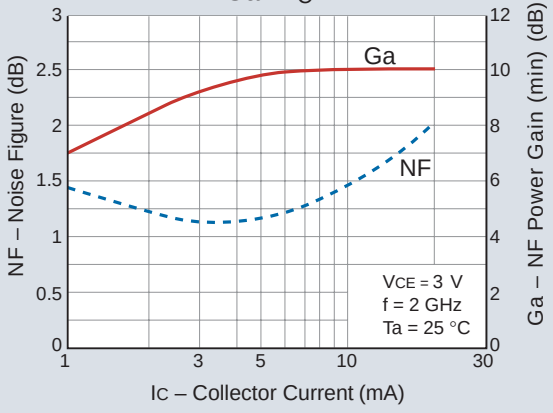
2SC5319

$|S_{21e}|^2$ – I_C



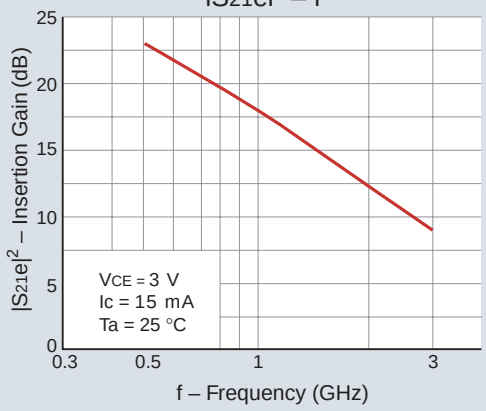
2SC5319

NF – I_C
Ga – I_C



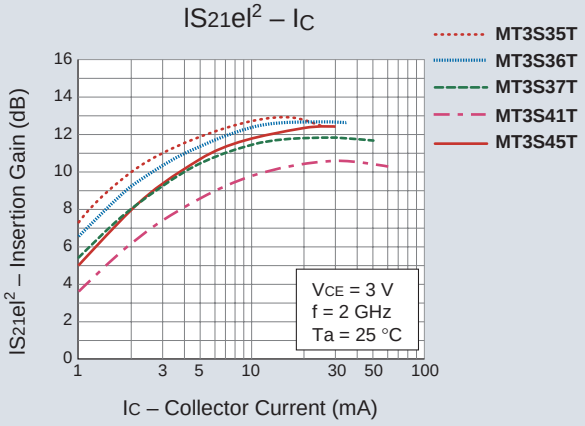
2SC5319

$|S_{21e}|^2$ – f

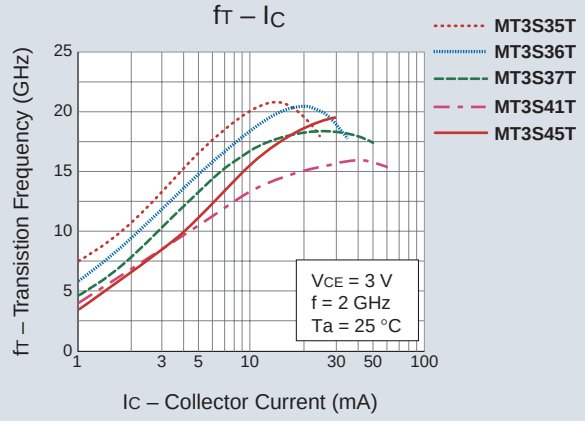


SMART-2 Transistor Series with fT =15 to 20 GHz

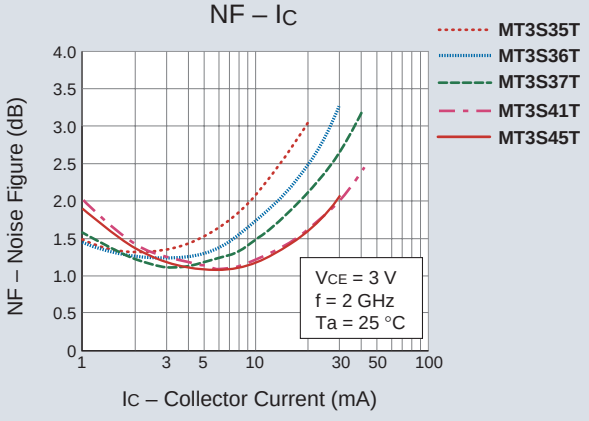
$|S_{21e}|^2$ – I_C



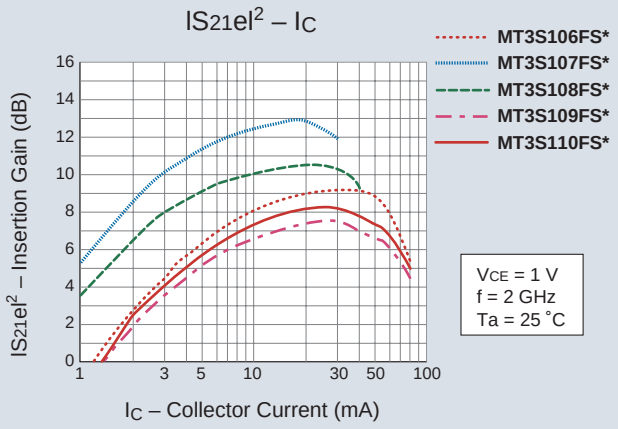
f_T – I_C



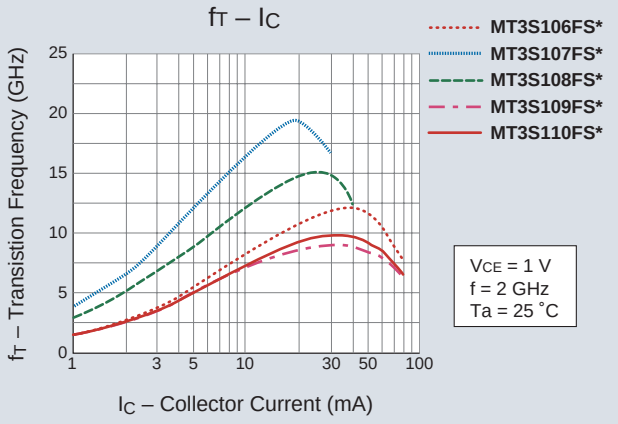
NF – I_C



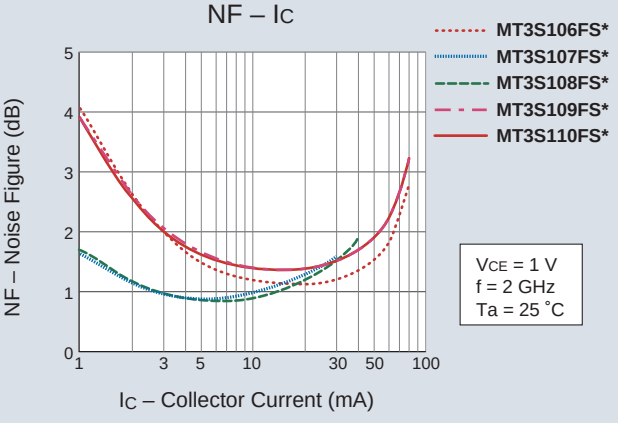
SMART-3 Transistor Series



* New product



* New product



* New product

Transistors for AM/FM Tuners

Application	Part Number	Max Ratings			Electrical Characteristics							Package
					h_{FE}			f_T Typ. (Min)			Cre	
		V_{CEO} (V)	I_C (mA)	P_C (mW)		V_{CE} (V)	I_C (mA)	(MHz)	V_{CE} (V)	I_C (mA)	(Cob) (pF)	
FM RF, MIX / OSC	2SC1923	30	20	100	40 to 200	6	1	550	6	1	0.7	TO-92
	2SC2668											MINI
	2SC2714											S-MINI
	2SC4215											USM
	2SC4915											SSM
FM OSC	2SC2995	30	50	200	40 to 240	6	1	350	6	1	0.9	MINI
	2SC2996			150								S-MINI
FM IF / AM CONV, IF	2SC380TM	30	50	300	40 to 240	12	2	(100)	10	1	(2.0)	TO-92
	2SC2669			200								MINI
	2SC2715			150								S-MINI
AM RF, CONV	2SC941TM	30	100	400	40 to 240	12	2	(80)	10	2	2.2	TO-92
	2SC2670			200								MINI
	2SC2716			150								S-MINI
AM CONV, IF	2SC1815	50	150	400	70 to 700	6	2	(80)	10	1	(2.0)	TO-92
	2SC2458			200								MINI
	2SC2712			150								S-MINI
	2SC4116			100								USM

Transistors for TV Tuners

Application	Part Number	Max Ratings			Electrical Characteristics													Package
		V_{CEO} (V)	I_C (mA)	P_C (mW)	h_{FE}	VCE (V)	IC (mA)	f_T (Typ.) (MHz)	VCE (V)	IC (mA)	Gp (GC)/NF (Typ.) (dB/dB)	VCC (V)	IC (mA)	V_{AGC} (V)	f (MHz)	Cre (Crb) (pF)	Cob (pF)	
VHF RF	MT3S150P**[1]	8	90	650	100 to 200	5	50	17000	5	50	10 / 0.95	5	10	–	1000	0.85	1.15	PW-MINI
VHF MIX	2SC3123	20	50	150	40 to 300	10	5	1400	10	5	(23) / 3.8	12	3	–	200	0.4	–	S-MINI
	2SC4250			100							(25) / 4.3					0.45		USM
VHF OSC	2SC3124	15	50	150	40 to 200	3	8	1100	10	8	–	–	–	–	–	–	0.9	S-MINI
	2SC4251			100														USM
	2SC4252	12	30	100	40 to 250	10	5	2000	10	5	–	–	–	–	–	–	1.1	USM
UHF RF	2SC4214	20	20	150	40 min	3	1	850	3	1	15 / 2.8	4.5	–	2	800	(0.3)	–	SMQ
	2SC4244			100							17 / 4					(0.4)		USM
UHF MIX	2SC3862	15	50	150	40 to 200	10	5	2400	10	2	–	–	–	–	–	0.6	–	S-MINI
																		E.B.Rev
UHF MIX OSC	2SC3120	15	50	150	40 to 200	10	5	2400	10	2	(17) / 8	10	2	–	800	0.6	–	S-MINI
	2SC4245			100														USM
UHF OSC	2SC3121	15	50	150	60 to 320	3	8	1500	10	8	–	–	–	–	–	–	0.9	S-MINI
	2SC4246			100														USM
	2SC3547A	12	30	150	35 to 130	10	5	4000	10	10	–	–	–	–	–	–	1.05	S-MINI
	2SC4247			100														USM
PIF AMP	2SC3125	25	50	150	20 to 200	10	10	600	10	10	–	–	–	–	–	–	1.1	S-MINI
	2SC4253			100														USM

* New product *[1] GaAs HBT

Transistors for Low-Noise VHF/UHF Amplifiers and Mixers

Application	TO-92	S-MINI	USM	SSM	TESM	fSM	SMQ	USQ	TESQ
VHF/UHF band	2SC2498	–	–	–	–	–	–	–	–
fT = 4 GHz high-current device	–	–	MT3S16U*	–	MT3S16T*	MT3S16FS*	–	–	–
fT = 7 GHz high-current device	–	2SC5084	2SC5085	2SC5086	2SC5086FT	–	2SC5087 2SC5087R*	2SC5088	–
fT = 7 GHz medium-current device	–	–	2SC5463	2SC5464	2SC5464FT	–	–	–	–
fT = 7 GHz low-current device	–	2SC5064	2SC5065	2SC5066	2SC5066FT	–	–	–	–
fT = 10 GHz high-current device	–	2SC5089	2SC5090	2SC5091	2SC5091FT	–	2SC5092	2SC5093	–
fT = 10 GHz low-current device	–	2SC5094	2SC5095	2SC5096	2SC5096FT	_	2SC5097	2SC5098	–
fT = 16 GHz high-current device	–	–	–	–	2SC5317FT	–	–	2SC5319	–
fT = 6 GHz low-voltage device	–	–	–	–	MT3S11T*	MT3S11FS*	–	–	–
fT = 7 GHz low-voltage device	–	MT3S04A	MT3S04AU	MT3S04AS	MT3S04AT	MT3S04AFS	MT4S04A	MT4S04AU	–
	–	–	–	–	MT3S12T*	–	–	–	–
	–	–	–	–	MT3S18T*	MT3S18FS*	–	–	–
fT = 8 GHz low-voltage device	–	–	–	–	MT3S106T*2	MT3S106FS*2	–	–	–
fT = 10 GHz low-voltage device	–	MT3S03A	MT3S03AU	MT3S03AS	MT3S03AT	MT3S03AFS	MT4S03A	MT4S03AU	–
	–	–	MT3S06U	MT3S06S	MT3S06T	MT3S06FS	MT4S06	MT4S06U	–
fT = 12 GHz low-voltage device	–	–	MT3S07U	MT3S07S	MT3S07T	MT3S07FS	MT4S07	MT4S07U	–
fT = 15 GHz low-voltage device	–	–	–	–	MT3S14T*	MT3S14FS*	–	–	–
	–	–	–	–	MT3S41T	MT3S41FS	–	–	–
fT = 16 GHz low-voltage device	–	–	–	–	–	–	–	MT4S32U	–
	–	–	–	–	MT3S107T*1	MT3S107FS*2	–	–	–
fT = 18 GHz low-voltage device	–	–	–	–	MT3S45T	MT3S45FS	–	–	–
fT = 19 GHz low-voltage device	–	–	–	–	MT3S37T	MT3S37FS	–	–	–
	–	–	–	–	MT3S36T	MT3S36FS	–	–	–
fT = 20 GHz low-voltage device	–	–	–	–	MT3S35T	MT3S35FS	–	–	–
fT = 21 GHz low-voltage device	–	–	–	–	–	–	–	MT4S101U*1	MT4S101T*1
fT = 22 GHz low-voltage device	–	–	–	–	–	–	–	MT4S100U*1	MT4S100T*1
fT = 25 GHz low-voltage device	–	–	–	–	–	–	–	MT4S102U*2	MT4S102T*2
	–	–	–	–	–	–	–	MT4S104U*2	MT4S104T*2
fT = 30 GHz low-voltage device	–	–	–	–	–	–	–	MT4S200U*2	–

* New product *1 SiGe *2 New product/SiGe

Transistors for Low-Noise VHF/UHF Amplifiers and Mixers

Application	Part Number	Max Ratings			Electrical Characteristics													Package
		V_{CEO}	I_C	P_C	Cob	Cre	f_T (Typ.)			$\|S_{21e}\|^2$ (Typ.)				NF (Typ.)				
								V_{CE}	I_C		V_{CE}	I_C	f		V_{CE}	I_C	f	
		(V)	(mA)	(mW)	(pF)	(pF)	(GHz)	(V)	(mA)	(dB)	(V)	(mA)	(GHz)	(dB)	(V)	(mA)	(GHz)	
VHF/UHF band	2SC2498	20	50	300	1.15	0.75	3.5	10	10	14.5	10	10	0.5	2.5	10	5	1.5	TO-92
fT = 4 GHz high-current device	MT3S16U	5	60	100	–	2.4	4	3	10	5.5	3	30	1	2.4	2	5	1	USM
	MT3S16T*																	TESM
	MT3S16FS*			50														fSM
fT = 7 GHz high-current device	2SC5084	12	80	150	1	0.65	7	10	20	11	10	20	1	1.1	10	5	1	S-MINI
	2SC5085			100														USM
	2SC5086																	SSM
	2SC5086FT																	TESM
	2SC5087			150	1.1					13								SMQ
	2SC5088			100														USQ
	2SC5087R*			150	–		8		30	13.5		30				7		SMQ(R)
fT = 7 GHz medium-current device	2SC5463	12	60	100	0.75	0.5	7	8	15	12	8	15	1	1.1	8	5	1	USM
	2SC5464																	SSM
	2SC5464FT																	TESM
fT = 7 GHz low-current device	2SC5064	12	30	150	0.7	0.45	7	5	10	12	5	10	1	1.1	5	3	1	S-MINI
	2SC5065			100														USM
	2SC5066																	SSM
	2SC5066FT																	TESM
fT = 10 GHz high-current device	2SC5089	10	40	150	0.7	0.5	10	8	20	7	8	20	2	1.7	8	5	2	S-MINI
	2SC5090			100														USM
	2SC5091																	SSM
	2SC5091FT																	TESM
	2SC5092			150	0.5	0.35				10				1.8				SMQ
	2SC5093			100	0.65	0.45				9.5								USQ
fT = 10 GHz low-current device	2SC5094	10	15	150	0.5	0.4	10	6	7	7.5	6	7	2	1.8	6	3	2	S-MINI
	2SC5095			100														USM
	2SC5096																	SSM
	2SC5096FT																	TESM
	2SC5097			150		0.35				10								SMQ
	2SC5098			100		0.34												USQ
fT = 16 GHz high-current device	2SC5317FT	5	20	100	0.6	0.45	15	3	15	9.5	3	15	2	1.3	3	5	2	TESM
	2SC5319					0.4				11.5								USQ

* New product

Transistors for Low-Noise VHF/UHF Amplifiers and Mixers

Application	Part Number	Max Ratings			Electrical Characteristics														Package
		V_{CEO}	I_C	P_C	Cob	Cre	f_T (Typ.)			$\|S_{21e}\|^2$ (Typ.)				NF (Typ.)				
								V_{CE}	I_C		V_{CE}	I_C	f		V_{CE}	I_C	f	
		(V)	(mA)	(mW)	(pF)	(pF)	(GHz)	(V)	(mA)	(dB)	(V)	(mA)	(GHz)	(dB)	(V)	(mA)	(GHz)	
fT = 6 GHz low-voltage device	MT3S11T	6	40	100	–	0.65	6	1	5	6.5	3	20	2	2.4	1	5	2	TESM
	MT3S11FS			50														fSM
fT = 7 GHz low-voltage device	MT3S04A	5	40	150	–	0.8	7	3	7	12.5	3	20	1	1.2	3	7	1	S-MINI
	MT3S04AU			100														USM
	MT3S04AS																	SSM
	MT3S04AT																	TESM
	MT3S04AFS			50														fSM
	MT4S04A			150		0.75				13.5								SMQ
	MT4S04AU			100														USQ
	MT3S12T	6	40	100	–	0.7	7	1	5	7	3	20	2	1.7	1	5	2	TESM
	MT3S18T	8	20	100	–	0.4	6	1	5	14	3	15	1	1.4	1	5	1	TESM
	MT3S18FS																	fSM
fT = 8 GHz low-voltage device	MT3S106T*2	13	80	100	–	0.55	8.5	1	10	9.5	3	20	2	1.2	1	10	2	TESM
	MT3S106FS*2					0.5				10								fSM
fT = 10 GHz low-voltage device	MT3S03A	5	40	150	–	0.75	10	3	10	8	3	20	2	1.4	3	7	2	S-MINI
	MT3S03AU			100														USM
	MT3S03AS																	SSM
	MT3S03AT																	TESM
	MT3S03AFS			50														fSM
	MT4S03A			150		0.7				9								SMQ
	MT4S03AU			100														USQ
	MT3S06U	5	15	60	–	0.25	10	3	5	9.5	3	7	2	1.6	3	3	2	USM
	MT3S06S																	SSM
	MT3S06T																	TESM
	MT3S06FS			50														fSM
	MT4S06			60		0.23				11.5								SMQ
	MT4S06U																	USQ
fT = 12 GHz low-voltage device	MT3S07U	5	25	100	–	0.4	12	3	10	9.5	3	15	2	1.5	3	5	2	USM
	MT3S07S																	SSM
	MT3S07T																	TESM
	MT3S07FS			50														fSM
	MT4S07			150						10.5								SMQ
	MT4S07U			100														USQ
fT = 15 GHz low-voltage device	MT3S14T	2.5	30	100	–	0.35	11	1	5	10	3	15	2	1.7	1	5	2	TESM
	MT3S14FS			50														fSM
	MT3S41T	4.5	80	100	0.9	0.55	15	3	20			20		1.2	3			TESM
	MT3S41FS			50														fSM
fT = 16 GHz low-voltage device	MT4S32U	4.5	15	67.5	0.4	0.2	16	3	10	13.5	3	10	2	1.4	3	3	2	USQ
	MT3S107T*2	8	20	100	–	0.24	15.5	1	10	13	3	10	2	0.9	1	7	2	TESM
	MT3S107FS*2	8.5			0.44	0.19	16.5							0.85		5	1	fSM
fT = 18 GHz low-voltage device	MT3S45T	4.5	40	100	0.73	0.36	15.5	3	20	11	3	20	2	1.2	3	7	2	TESM
	MT3S45FS			50														fSM
fT = 19 GHz low-voltage device	MT3S37T	4.5	50	100	0.66	0.35	19	3	20	12	3	20	2	1.2	3	3	2	TESM
	MT3S37FS			50														fSM
	MT3S36T		36	100	0.55	0.26			15	12.5		15		1.3				TESM
	MT3S36FS			50														fSM
fT = 20 GHz low-voltage device	MT3S35T	4.5	24	100	0.48	0.21	20	3	10	13	3	10	2	1.4	3	2	2	TESM
	MT3S35FS			50														fSM
fT = 21 GHz low-voltage device	MT4S101U*1	3	10	30	0.34	0.10	21	2	7	16	2	7	2	0.8	2	5	2	USQ
	MT4S101T*1						23			17								TESQ
fT = 22 GHz low-voltage device	MT4S100U*1	3	15	45	0.41	0.14	22	2	10	16	2	10	2	0.72	2	5	2	USQ
	MT4S100T*1						23			17								TESQ
fT = 25 GHz low-voltage device	MT4S102U*1	3	20	60	0.43	0.17	24	2	15	15	2	15	2	0.58	2	10	2	USQ
	MT4S102T*1						25			16								TESQ
	MT4S104U*1	3	10	30	0.26	0.09	23	2	7	17	2	7	2	0.67	2	5	5	USQ
	MT4S104T*1						25			18								TESQ
fT = 30 GHz low-voltage device	MT4S200U*2	8	35	100	0.25	0.074	30	3	15	17.5	3	15	2	1.7	3	5	2	USQ

* New product *1 SiGe *2 New product/SiGe

Transistors for VHF/UHF Oscillators

Application	S-MINI	USM	SSM	TESM	fSM	SMQ	USQ
VHF / UHF band	2SC3547A	–	–	–	–	–	–
	–	2SC4247	–	–	–	–	–
fT = 5 GHz high-current device	2SC5109	2SC5110	2SC5111	2SC5111FT	–	–	–
fT = 6 GHz low-current device	2SC5106	2SC5107	2SC5108	2SC5108FT	–	–	–
fT = 7 GHz low-voltage device	MT3S04A	MT3S04AU	MT3S04AS	MT3S04AT	MT3S04AFS	MT4S04A	MT4S04AU
	–	–	–	MT3S05T	MT3S05FS	–	–
	–	–	–	MT3S08T	MT3S08FS	–	–
	–	–	–	MT3S11T	MT3S011FS*	–	–
	–	–	–	MT3S12T	–	–	–
	–	–	–	MT3S18T	MT3S18FS	–	–
fT = 8 GHz low-current device	–	–	–	MT3S106T*	MT3S106FS*	–	–
	–	–	–	–	MT3S109FS*	–	–
	–	–	–	–	MT3S110FS*	–	–
fT = 10 GHz low-voltage device	MT3S03A	MT3S03AU	MT3S03AS	MT3S03AT	MT3S03AFS	MT4S03A	MT4S03AU
fT = 13 GHz low-voltage device	–	–	–	–	MT3S108FS*	–	–

* New product / SiGe

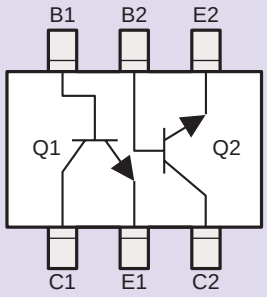
Transistors for VHF/UHF Oscillators

Application	Part Number	Max Ratings			Electrical Characteristics													Package
		V_{CEO}	I_C	P_C	Cob	Cre	f_T (Typ.)			$\|S_{21e}\|^2$ (Typ.)				NF (Typ.)				
								V_{CE}	I_C		V_{CE}	I_C	f		V_{CE}	I_C	f	
		(V)	(mA)	(mW)	(pF)	(pF)	(GHz)	(V)	(mA)	(dB)	(V)	(mA)	(GHz)	(dB)	(V)	(mA)	(GHz)	
VHF / UHF band	2SC3547A	12	30	150	1.05	–	4	10	10	–	–	–	–	–	–	–	–	S-MINI
	2SC4247			100														USM
fT = 5 GHz high-current device	2SC5109	10	60	150	0.9	0.7	5	5	5	10	5	5	1	–	–	–	–	S-MINI
	2SC5110			100														USM
	2SC5111																	SSM
	2SC5111FT																	TESM
fT = 6 GHz low-current device	2SC5106	10	30	150	0.7	0.5	6	5	5	11	5	5	1	–	–	–	–	S-MINI
	2SC5107			100														USM
	2SC5108																	SSM
	2SC5108FT																	TESM
fT = 7 GHz low-voltage device	MT3S04A	5	40	150	–	0.8	7	3	7	12.5	3	20	1	1.2	3	7	1	S-MINI
	MT3S04AU			100														USM
	MT3S04AS																	SSM
	MT3S04AT																	TESM
	MT3S04AFS			50														fSM
	MT4S04A			150		0.75				13.5								SMQ
	MT4S04AU			100														USQ
	MT3S05T	5	40	100	–	0.9	4.5	1	5	8.5	1	5	1	1.4	1	5	1	TESM
	MT3S05FS			50														fSM
	MT3S08T	8	40	100	–	0.55	4.5	1	5	10.5	1	5	1	1.4	1	5	1	TESM
	MT3S08FS			50														fSM
	MT3S11T	13	40	100	–	0.65	6	1	5	6.5	3	20	2	2.4	1	5	2	TESM
	MT3S11FS			50														fSM
	MT3S12T	13	40	100	–	0.7	7	1	5	7	3	20	2	1.7	1	5	2	TESM
	MT3S18T	8	20	100	–	0.4	6	1	5	14	3	15	1	1.4	1	5	1	TESM
	MT3S18FS			50														fSM
fT = 8 GHz low-voltage device	MT3S106T*	13	80	100	–	0.55	8.5	1	10	9.5	3	20	2	1.2	1	10	2	TESM
	MT3S106FS*	13	80	100	–	0.5	8.5	1	10	8	1	10	2	1.2	1	10	2	fSM
	MT3S109FS*	13	80	100	–	0.75	7.1	1	10	8.2	3	20	2	1.35	1	15	2	fSM
	MT3S110FS*	13	80	100	–	0.6	7.5	1	10	9	3	20	2	1.3	1	15	2	fSM
fT = 10 GHz low-voltage device	MT3S03A	5	40	150	–	0.75	10	3	10	8	3	20	2	1.4	3	7	2	S-MINI
	MT3S03AU			100														USM
	MT3S03AS																	SSM
	MT3S03AT																	TESM
	MT3S03AFS			50														fSM
	MT4S03A			150		0.7				9								SMQ
	MT4S03AU			100														USQ

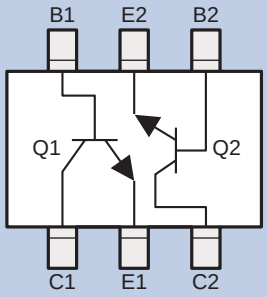
* New product

Pin Assignment for Dual-Transistor Devices

●MT6C Series

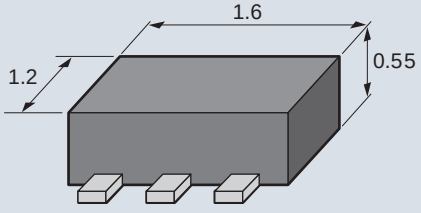


●MT6L Series



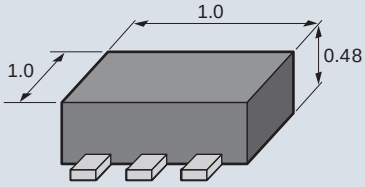
Package Dimensions for Dual-Transistor Devices

● ES6



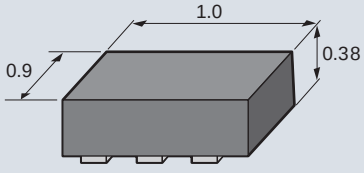
Unit: mm

● fS6



Unit: mm

●CST6



Unit: mm

Dual-Transistor Devices (MT Series)

Application	ES6	fS6	CST6
VHF / UHF Buffer + OSC	MT6L03E	–	–
	MT6L04AE	–	–
	MT6L05E	MT6L05FS	–
	–	MT6L11FS	–
	MT6L53E	–	–
	MT6L54E	–	–
	MT6L55E	MT6L55FS	–
	MT6L56E	–	–
	MT6L57AE	–	–
	MT6L58AE	–	–
	MT6L61AE	–	–
	MT6L62AE	–	–
	–	MT6L63FS	–
	–	MT6L64FS	–
	–	MT6L65FS	–
	–	MT6L66FS*	MT6L66CT*
	–	MT6L67FS*	MT6L67CT*
	–	MT6L68FS	–
	–	MT6L71FS	–
	–	MT6L72FS	–
	–	MT6L73FS*	MT6L73CT*
	–	MT6L74FS*	MT6L74CT*
	–	MT6L75FS*	MT6L75CT*
	–	MT6L76FS*	MT6L76CT*
	–	MT6L77FS*	MT6L77CT*
	–	MT6L78FS	–
	MT6C03AE	–	–
	MT6C04AE	–	–
	MT6C06E	–	–

* New product

Dual-Transistor Devices (MT Series)

Application	Part Number	Tr	V_{CEO} (V)	I_C (mA)	P_C*1 (mW)	h_{FE}	V_{CE} (V)	I_C (mA)	f_T (Typ.) (GHz)	V_{CE} (V)	I_C (mA)	NF (Typ.) (dB)	V_{CE} (V)	I_C (mA)	f (GHz)	Constituent Parts	Package
VHF / UHF Low Noise Amp	MT6L03AT		5	40	200	80 to 160	1	5	10	3	10	1.4	3	7	2	MT3S03AS x 2	TU6
	MT6L03AE		5	40	100	80 to 160	1	5	10	3	10	1.4	3	7	2	MT3S03AT x 2	ES6
	MT6L04AT		5	40	200	80 to 160	1	5	7	3	7	1.2	3	7	1	MT3S04AS x 2	TU6
	MT6L04AE		5	40	100	80 to 160	1	5	7	3	7	1.2	3	7	1	MT3S04AT x 2	ES6
VHF / UHF Buffer + OSC	MT6L05E		5	40	100	80 to 140	1	5	4.5	1	5	1.4	1	5	1	MT3S05T x 2	ES6
	MT6L05FS		5	40	50	80 to 140	1	5	4.5	1	5	1.4	1	5	1	MT3S05FS x 2	fS6
	MT6L11FS*		6	40	50	100 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11FS* x 2	fS6
	MT6L53E	Q1	5	15	100	70 to 140	1	5	10	3	5	1.6	3	3	2	MT3S06T	ES6
		Q2	5	40		80 to 140	1	5	4.5	1	5	1.4	1	5	1	MT3S05T	
	MT6L54E	Q1	5	15	100	70 to 140	1	5	10	3	5	1.6	3	3	2	MT3S06T	ES6
		Q2	8	40		80 to 140	1	5	4.5	1	5	1.4	1	5	1	MT3S08T	
	MT6L55E	Q1	5	25	100	70 to 140	1	5	12	3	10	1.5	3	5	2	MT3S07T	ES6
		Q2	5	40		80 to 140	1	5	4.5	1	5	1.4	1	5	1	MT3S05T	
	MT6L55FS	Q1	5	25	50	70 to 140	1	5	12	3	10	1.5	3	5	2	MT3S07FS	fS6
		Q2	5	40		80 to 140	1	5	4.5	1	5	1.4	1	5	1	MT3S05FS	
	MT6L56E	Q1	5	25	100	70 to 140	1	5	12	3	10	1.5	3	5	2	MT3S07T	ES6
		Q2	8	40		80 to 140	1	5	4.5	1	5	1.4	1	5	1	MT3S08T	
	MT6L57AE	Q1	5	15	100	70 to 140	1	5	10	3	5	1.6	3	3	2	MT3S06T	ES6
		Q2	5	40		80 to 160	1	5	7	3	7	1.2	3	7	1	MT3S04AT	
	MT6L58AE	Q1	5	15	100	70 to 140	1	5	10	3	5	1.6	3	3	2	MT3S06T	ES6
		Q2	5	40		80 to 160	1	5	10	3	10	1.4	3	7	2	MT3S03AT	

* New product, *1 Total Pc

Dual-Transistor Devices (MT Series)

Application	Part Number	Tr	V_{CEO} (V)	I_C (mA)	P_C *1 (mW)	h_{FE}	V_{CE} (V)	I_C (mA)	f_T (Typ.) (GHz)	V_{CE} (V)	I_C (mA)	NF (Typ.) (dB)	V_{CE} (V)	I_C (mA)	f (GHz)	Constituent Parts	Package
VHF / UHF Buffer + OSC	MT6L61AE	Q1	5	25	100	70 to 140	1	5	12	3	10	1.5	3	5	2	MT3S07T	ES6
		Q2	5	40		80 to 160	1	5	7	3	7	1.2	3	7	1	MT3S04AT	
	MT6L62AE	Q1	5	25	100	70 to 140	1	5	12	3	10	1.5	3	5	2	MT3S07T	ES6
		Q2	5	40		80 to 160	1	5	10	3	10	1.4	3	7	2	MT3S03AT	
	MT6L63FS	Q1	5	25	50	70 to 140	1	5	12	3	10	1.5	1	5	2	MT3S07FS	fS6
		Q2	6	40		80 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11FS	
	MT6L64FS	Q1	4.5	24	50	70 to 140	3	10	20	3	10	1.4	3	2	2	MT3S35FS	fS6
		Q2	6	40		100 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11FS*	
	MT6L65FS	Q1	4.5	36	50	70 to 140	3	10	20	3	10	1.3	3	2	2	MT3S36FS	fS6
		Q2	6	40		100 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11FS*	
	MT6L66FS*	Q1	4.5	24	100	70 to 140	3	10	19.5	3	10	1.4	3	2	2	MT3S35FS	fS6
		Q2	6	80		110 to 160	1	5	8.5	1	10	1.2	1	10	2	MT3S106FS*	
	MT6L67FS*	Q1	4.5	36	100	70 to 140	3	10	20	3	15	1.3	3	3	2	MT3S36FS	fS6
		Q2	6	80		110 to 160	1	5	8.5	1	10	1.2	1	10	2	MT3S106FS*	
	MT6L68FS	Q1	5	15	50	70 to 140	1	5	10	3	5	1.7	1	3	2	MT3S06FS	fS6
		Q2	6	40		100 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11FS	
	MT6L71FS	Q1	5	25	50	70 to 140	1	5	12	3	10	1.5	3	5	2	MT3S07FS	fS6
		Q2	6	40		100 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11AFS	
	MT6L72FS	Q1	4.5	36	50	70 to 140	3	10	19	3	15	1.3	3	3	2	MT3S36FS	fS6
		Q2	6	40		100 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11AFS	
	MT6L73FS*	Q1	5	25	100	70 to 140	1	5	12	3	10	1.5	1	5	2	MT3S07FS	fS6
		Q2	6	50		75 to 125	1	5	7	1	10	1.35	1	15	2	MT3S109FS*	
	MT6L74FS*	Q1	5	25	100	70 to 140	1	5	12	3	10	1.5	1	5	2	MT3S07FS	fS6
		Q2	6	80		75 to 125	1	5	7.5	1	10	1.35	1	15	2	MT3S110FS*	
	MT6L75FS*	Q1	5	25	100	70 to 140	1	5	12	3	10	1.5	1	5	2	MT3S07FS	fS6
		Q2	6	80		110 to 160	1	5	8.5	1	10	1.2	1	10	2	MT3S106FS*	
	MT6L76FS*	Q1	5	15	100	70 to 140	1	5	10	3	5	1.7	1	3	2	MT3S06FS	fS6
		Q2	6	80		110 to 160	1	5	8.5	1	10	1.2	1	10	2	MT3S106FS*	
	MT6L77FS*	Q1	6	40	100	100 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11FS	fS6
		Q2	6	80		110 to 160	1	5	8.5	1	10	1.2	1	10	2	MT3S106FS*	
	MT6L78FS	Q1	6	40	50	100 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11FS	fS6
		Q2	6	40		100 to 160	1	5	6	1	5	2.4	1	5	2	MT3S11AFS	
	MT6C03AE		5	40	100	80 to 160	1	5	10	3	10	1.4	3	7	2	MT3S03AT x 2	ES6
	MT6C04AE		5	40	100	80 to 160	1	5	7	3	7	1.2	3	7	1	MT3S04AT x 2	ES6
	MT6C06E		5	15	60	70 to 140	1	5	10	3	5	1.6	3	3	2	MT3S06T x 2	ES6

* New product / SiGe, *1 Total Pc

2-2 FETs

MOSFETs and JFETs for AM/FM Tuners

Application	Part Number	Max Ratings			Electrical Characteristics												Package
		V_{DS} V_{GDS}*1 V_{GDO}*2	I_D (I_G)	P_D	I_{DSS}(Typ.)			$\|Y_{fs}\|$ (Typ.)				Gps/NF (Typ.)					
						V_{DS}	V_{G1S}/V_{G2S}	@1kHz	V_{DS}	I_D	V_{G2S} (V_{GS})		V_{DS}	I_D	V_{G2S} (V_{GS})	f	
		(V)	(mA)	(mW)	(mA)	(V)	(V)	(mS)	(V)	(mA)	(V)	(dB/dB)	(V)	(mA)	(V)	(MHz)	
FM RF, MIX	3SK195	13.5	30	150	0 to 0.1	6	0 / 4	13	6	10	4	27 / 1.1	6	–	4	200	SMQ
	3SK225	13.5	30	150	0 to 0.1	6	0 / 4.5	21	6	10	4.5	22 / 2.0	6	10	4.5	500	SMQ
	3SK257			100													USQ
	3SK226	13.5	30	150	0 to 0.1	6	0 / 4.5	13	6	10	4.5	27 / 1.1	6	10	4.5	200	SMQ
	3SK258			100													USQ
FM RF	2SK241	20	30	200	1.5 to 14	10	0	10	10	–	(0)	28 / 1.7	10	–	(0)	100	MINI
	2SK302			150													S-MINI
	2SK882			100	3 to 14												USM
	2SK161*	–18*1	(10)	200	1 to 10	10	0	9	10	–	(0)	18 / 2.5	10	–	(0)	100	MINI
	2SK211*			150													S-MINI
	2SK881*			100													USM
	2SK1771	12.5	30	150	0 to 0.1	8	0	15	8	10	–	23 / 1.0	8	16	–	100	SMQ
FM RF, OSC	2SK192A*	–18*1	(10)	200	3 to 24	10	0	7	10	–	(0)	24 / 1.8	10	–	(0)	100	MINI
	2SK210*			100													S-MINI
AM RF	2SK709*	–20*2	(10)	300	6 to 32	5	0	25	5	–	(0)	– / 0.5	5	1	Rg 1kΩ	1kHz	TO-92
	2SK710*			200													MINI
	2SK711*			150								–	–	–	–	–	S-MINI
	2SK1875*			100													USM

* JFET

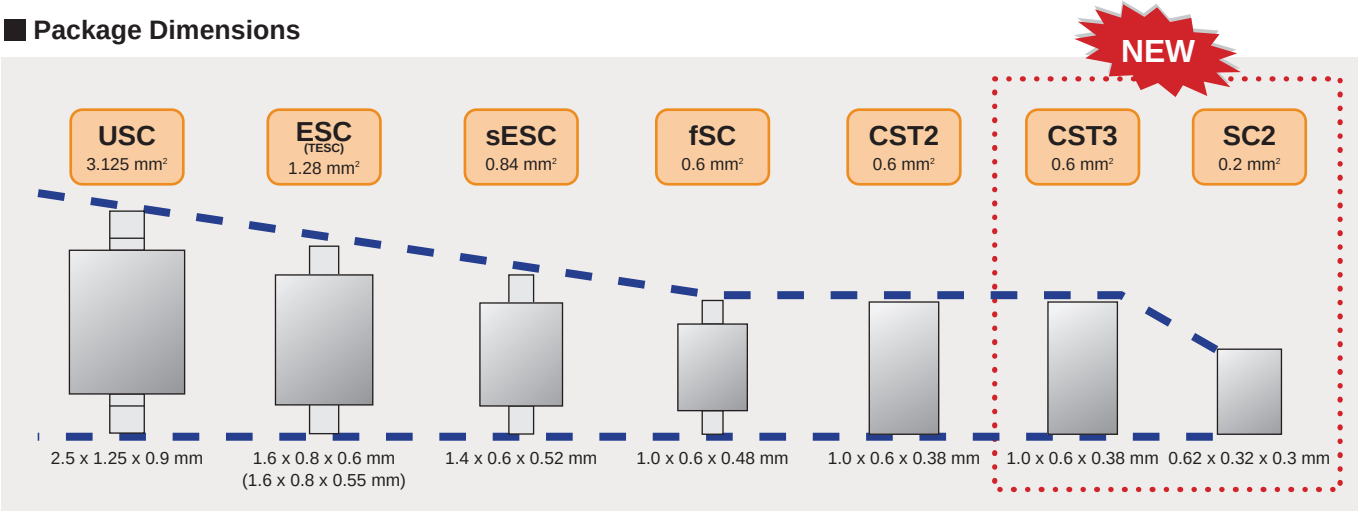
FETs for VHF/UHF Bands

Application	Part Number	Max Ratings			Electrical Characteristics												Package
		V_{DS}	I_D	P_D	I_{DSS}(Typ.)			$\|Y_{fs}\|$ (Typ.)				Gps(G_{CS})/NF(NF_{CS}) (Typ.)					
						V_{DS}	V_{G1S}/V_{G2S}	@1kHz	V_{DS}	I_D	V_{G2S}		V_{DS} (V_{DD})	I_D	V_{G2S}	f	
		(V)	(mA)	(mW)	(mA)	(V)	(V)	(mS)	(V)	(mA)	(V)	(dB/dB)	(V)	(mA)	(V)	(MHz)	
VHF RF, MIX	3SK260	15	30	100	3 to 14	6	0 / 3	27	6	10	3	(24.5) / (3.3)	(10)	–	–	200	USQ
	3SK195	13.5	30	150	0 to 0.1	6	0 / 4	13	6	10	4	27 / 1.1	6	10	4	200	SMQ
	3SK225	13.5	30	150	0 to 0.1	6	0 / 4.5	21	6	10	4.5	22 / 2.0	6	10	4.5	500	SMQ
	3SK257			100													USQ
	3SK226	13.5	30	150	0 to 0.1	6	0 / 4.5	13	6	10	4.5	27 / 1.1	6	10	4.5	200	SMQ
	3SK258			100													USQ
	3SK292	12.5	30	150	0 to 0.1	6	0 / 4.5	23.5	6	10	4.5	21.5 / 1.8	6	10	4.5	500	SMQ
	3SK294			100													USQ
UHF RF, MIX	3SK199	13.5	30	150	0 to 0.1	6	0 / 4	21.5	6	10	4	19.5 / 1.9	6	10	4	800	SMQ
	3SK207	13.5	30	150	0 to 0.1	6	0 / 4.5	21.5	6	10	4.5	19.5 / 1.9	6	10	4.5	800	SMQ
	3SK256			100													USQ
	3SK232	12.5	30	150	0 to 0.1	6	0 / 4.5	21	6	10	4.5	20 / 1.5	6	10	4.5	800	SMQ
	3SK249			100													USQ
	3SK259	15	30	100	0 to 0.1	6	0 / 3	18.5	6	10	3	19 / 2.6	6	10	3	800	USQ
	3SK291	12.5	30	150	0 to 0.16	6	0 / 4.5	27	6	10	4.5	23 / 1.5	6	10	4.5	800	SMQ
	3SK293			100													USQ

2-3 Diodes

- New ultra-thin chip-scale packages : CST3 (1.0 x 0.6 x 0.38 mm) and SC2 (0.62 x 0.32 x 0.3 mm)

Package Dimensions



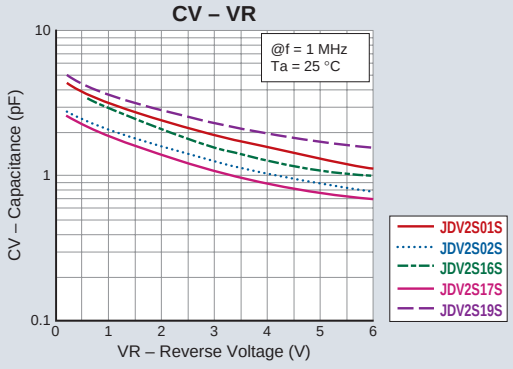
Varicap Diodes for VCOs and VCXOs

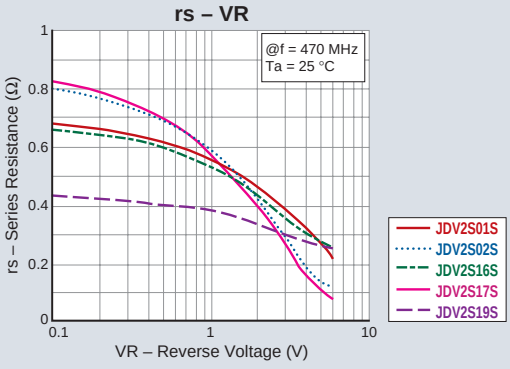
Application	USC	ESC	USQ	TESQ	sESC	fSC	CST3	SC2
VHF / UHF VCO	1SV229	1SV279**	1SV306	—	—	—		
	1SV270	1SV281**	—	—	—	—		
	1SV276	1SV284**	—	—	JDV2S06S	JDV2S06FS		
L-Band VCO	1SV239	1SV280**	—	—	—	—		
	1SV277	1SV285**	—	—	JDV2S07S	JDV2S07FS		
UHF Wideband VCO	1SV304	1SV305	JDV4P08U	JDV4P08T	JDV2S08S	JDV2S08FS		
	1SV310	1SV311	—	—	JDV2S09S	JDV2S09FS		
	1SV313	1SV314	—	—	JDV2S10S	JDV2S10FS		
UHF VCO	1SV328	1SV329	—	—	JDV2S13S	JDV2S13FS		
	—	JDV2S01E	—	—	JDV2S01S	JDV2S01FS		
	—	JDV2S02E	—	—	JDV2S02S	JDV2S02FS		
	—	JDV2S05E	—	—	JDV2S05S	JDV2S05FS		
	—	—	—	—	JDV2S16S	JDV2S16FS		
	—	—	—	—	JDV2S17S*	JDV2S17FS*		
	—	—	—	—	JDV2S19S	JDV2S19FS		
	—	—	—	—	JDV2S22S*	JDV2S22FS*		
	—	—	—	—	—	JDV2S25FS*	JDV3S25CT*	JDV2S25SC*
	—	—	—	—	—	JDV2S26FS*	JDV3S26CT*	JDV2S26SC*
	—	—	—	—	—	JDV2S27FS*	JDV3S27CT*	JDV2S27SC*
	—	—	—	—	—	JDV2S28FS*	JDV3S28CT*	JDV2S28SC*
	—	—	—	—	—	JDV2S29FS*	JDV3S29CT*	JDV2S29SC*
VCXO	1SV322	1SV323	—	—	—	—	—	—
	1SV324	1SV325	—	—	—	—	—	—
	1SV330	1SV331	—	—	—	—	—	—

* New product, ** Manufactured at an overseas factory

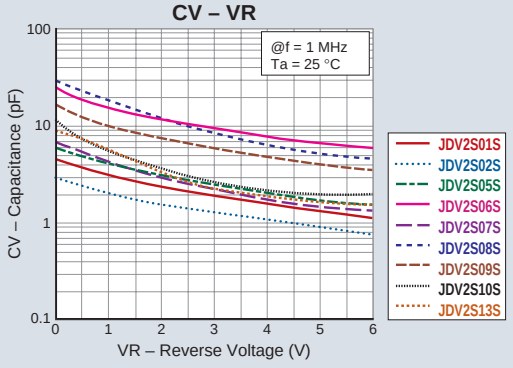
Varicap Diodes for VCOs

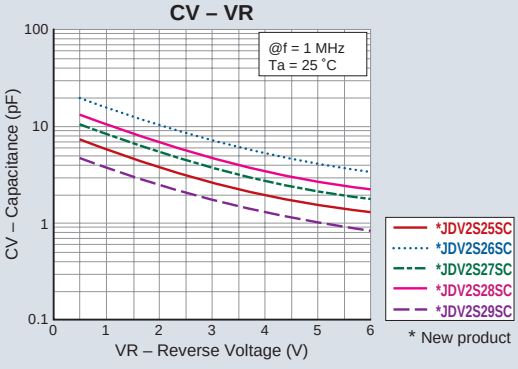
New varicap diodes for VCOs
Higher capacitance variation, ratio compared to the conventional JDV2S01 and JDV2S02

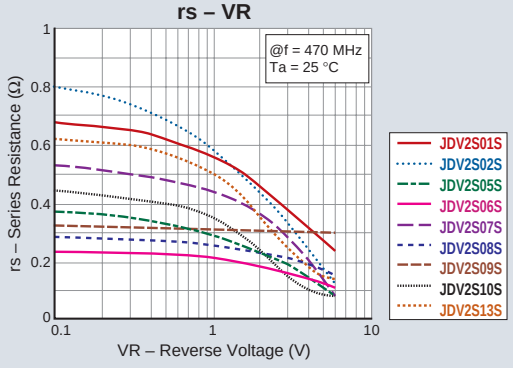


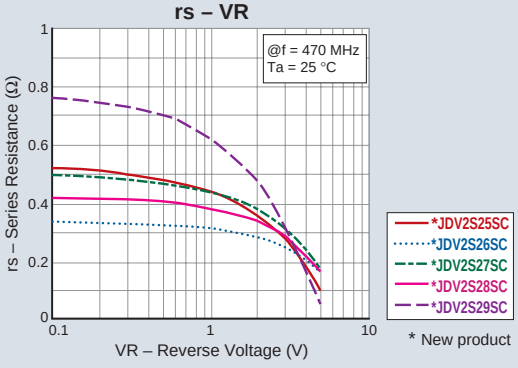


Varicap diodes for VCOs
Suitable for VHF/UHF VCOs









Varicap Diodes for VCOs and VCXOs

Application	Part Number	V_R (V)	I_R (nA)	V_R (V)	CT (1) (pF)	V_R (V)	CT (2) (pF)	V_R (V)	CT(1) / CT(2)	rs (Typ.) (Ω)	V_R (V)	f (MHz)	Package
VHF / UHF VCO	1SV229	15	3	15	14 to 16	2	5.5 to 6.5	10	2.0 min	0.2	5	470	USC
	1SV279												ESC
	1SV306												USQ
	1SV270	10	3	10	15 to 17	1	7.3 to 8.7	4	1.8 min	0.28	1	470	USC
	1SV281												ESC
	1SV276	10	3	10	15 to 17	1	7.0 to 8.5	4	1.8 min	0.22	1	470	USC
	1SV284												ESC
	JDV2S06S									0.27			sESC
	JDV2S06FS												fSC
L-Band VCO	1SV239	15	3	15	3.8 to 4.7	2	1.5 to 2.0	10	2.0 min	0.45	1	470	USC
	1SV280												ESC
	1SV277	10	3	10	4.0 to 4.9	1	1.85 to 2.35	4	2.0 min	0.42	1	470	USC
	1SV285												ESC
	JDV2S07S												sESC
	JDV2S07FS												fSC
UHF Wideband VCO	1SV304	10	3	10	17.3 to 19.3	1	5.3 to 6.6	4	3 typ.	0.27	1	470	USC
	1SV305												ESC
	JDV4P08U									0.35			USQ
	JDV4P08T												TESQ
	JDV2S08S												sESC
	JDV2S08FS												fSC
	1SV310	10	3	10	9.7 to 11.1	1	4.45 to 5.45	4	1.8 min	0.28	1	470	USC
	1SV311												ESC
	JDV2S09S									0.33			sESC
	JDV2S09FS												fSC
	1SV313	10	3	10	7.3 to 8.4	0.5	2.75 to 3.4	2.5	2.4 min	0.35	1	470	USC
	1SV314												ESC
	JDV2S10S												sESC
	JDV2S10FS												fSC
UHF VCO	1SV328	10	3	10	5.7 to 6.7	1	1.85 to 2.45	4	2.8 typ.	0.55	1	470	USC
	1SV329												ESC
	JDV2S13S									0.55			sESC
	JDV2S13FS												fSC
	JDV2S01E	10	3	10	2.85 to 3.45	1	1.35 to 1.81	4	1.8 min	0.5	1	470	ESC
	JDV2S01S												sESC
	JDV2S01FS												fSC
	JDV2S02E	10	3	10	1.8 to 2.3	1	0.83 to 1.23	4	1.8 min	0.6	1	470	ESC
	JDV2S02S												sESC
	JDV2S02FS												fSC
	JDV2S05E	10	3	10	3.85 to 4.55	1	1.94 to 2.48	4	1.7 min	0.3	1	470	ESC
	JDV2S05S												sESC
	JDV2S05FS												fSC
	JDV2S16S	10	3	10	3.59 typ.	0.5	1.8 typ.	2.5	2.0 typ.	0.5	1	470	sESC
	JDV2S16FS												fSC
	JDV2S17S	10	3	10	1.9 typ.	1	0.9 typ.	4	2.1 typ.	0.6	1	470	sESC
	JDV2S17FS												fSC
	JDV2S19S	10	3	10	3.66 typ.	1	2.0 typ.	4	1.82 typ.	0.35	1	470	sESC
	JDV2S19FS												fSC
	JDV2S22S	10	3	10	3.24 to 3.62	1	1.77 to 1.99	3	1.82	0.5	1	470	sESC
	JDV2S22FS												fSC

Application	Part Number	V_R (V)	I_R (nA)	V_R (V)	CT (1) (pF)	V_R (V)	CT (2) (pF)	V_R (V)	CT(1) / CT(2)	rs (Typ.) (Ω)	V_R (V)	f (MHz)	Package
UHF VCO	JDV2S25FS*	10	1	5	5.62 to 5.99	1	1.91 to 2.12	4	2.77 to 2.98	0.49	1	470	fSC
	JDV3S25CT*									0.47			CST3
	JDV2S25SC*				5.57 to 5.93		1.88 to 2.08		2.81 to 3				SC2
	JDV2S26FS*	10	1	5	15.35 to 16.31	1	5.27 to 5.6	4	2.82 to 3	0.4	1	470	fSC
	JDV3S26CT*									0.37			CST3
	JDV2S26SC*				15.33 to 16.29		5.25 to 5.58		2.83 to 3.01	0.36			SC2
	JDV2S27FS*	10	1	5	8.06 to 8.56	1	2.79 to 2.98	4	2.79 to 2.98	0.49	1	470	fSC
	JDV3S27CT*									0.48			CST3
	JDV2S27SC*				8 to 8.5		2.75 to 2.93		2.81 to 3				SC2
	JDV2S28FS*	10	1	5	10.2 to 10.83	1	3.42 to 3.64	4	2.88 to 3.07	0.41	1	470	fSC
	JDV3S28CT*									0.4			CST3
	JDV2S28SC*				10.13 to 10.77		3.38 to 3.6		2.9 to 3.08				SC2
	JDV2S29FS*	10	1	6	3.59 to 3.87	1	1.26 to 1.40	4	2.73 to 2.91	0.66	1	470	fSC
	JDV3S29CT*									0.64			CST3
	JDV2S29SC*				3.54 to 3.83		1.22 to 1.37		2.73 to 2.92				SC2
VCXO	1SV322	10	3	10	26 to 30	1	6 to 7.1	4	4 min	0.4	4	100	USC
	1SV323												ESC
	1SV324	10	3	10	43 to 49.5	1	8.5 to 12.2	4	4 min	0.4	4	100	USC
	1SV325												ESC
	1SV330	10	3	10	18	1	5.1	4	3.5 typ.	0.45	1	470	USC
	1SV331												ESC

* New product

Varicap Diodes for AM/FM Tuners

Application	Part Number	V_R (V)	I_R (nA)	V_R (V)	C_T (1) (pF)	V_R (V)	C_T (2) (pF)	V_R (V)	Q (r_s(Ω)Typ.) min (–)	V_R (V)	f (MHz)	Package
AM Tuning	1SV102	30	50	30	360 to 460	2	15 to 21	25	200	2	1	MINI
FM Tuning	1SV101	15	10	15	28 to 32	3	12 to 14	9	(0.3)	C = 30 pF	50	MINI
FM Tuning (Twin)	1SV103	32	50	30	37 to 42	3	13.2 to 16.2	30	(0.35)*	C = 20 pF	50	MINI
	1SV228	15	10	15	28.5 to 32.5*	3	11.7 to 13.7*	8	(0.3)*	3	100	S–MINI
	1SV147		50							C = 30 pF	50	MINI
	1SV225	32	50	30	18.5 to 21*	3	6.6 to 7.7*	30	(0.35)*	3	100	S–MINI
	JDV3C11	20	10	20	65.8 to 74.2	1	11.5 to 14.3	4.5	(0.4)	1.5	100	S–MINI
	JDV3C34	12	10	10	67.9 to 72.1	2	26.1 to 27.8	6	(0.2)	2	100	S–MINI
AFC	1SV160	15	100	4	7 to 14	4	–	–	(0.7)	4	50	S–MINI

* Series-connected capacitance

Varicap Diode Arrays for AM Tuners

Application	Part Number	V_R (V)	I_R (nA)	V_R (V)	C_T (1) (pF)	V_R (V)	C_T (2) (pF)	V_R (V)	Q min (–)	Q V_R (V)	Q f (MHz)	Constituent Parts	Package
AM Tuning	HN1V01H	16	20	16	435 to 540	1	19.9 to 26.7	8	200	1	1	1SV149 x 4	FM8
	HN1V02H											1SV149 x 2	
	HN2V02H											1SV149 x 3	

Varicap Diodes for TV Tuners

Application	Part Number	V_R (V)	I_R (nA)	V_R (V)	C_T (1) (pF)	V_R (V)	C_T (2) (pF)	V_R (V)	C_T (1) /C_T (2)	r_s (Typ.) (Ω)	V_R (V)	f (MHz)	Package
AFC	1SV216	30	10	28	10.5 to 16	2	3.3 to 5.7	10	2.5 to 3.4	0.55	5	470	USC
VHF Tuning (CATV)	1SV215*[1]	30	10	28	26 to 32	2	2.5 to 3.2	25	5.9 min	0.6	5	470	USC
	1SV231*[1]	30	10	28	41 to 49.5	2	2.7 to 3.4	25	14 min	1.05	5	470	USC
	1SV232	30	10	28	28 to 32	2	2.75 to 3.1	25	10 min	0.55	5	470	USC
	1SV242	30	10	28	36 to 4.2	1	2.43 to 3.0	28	13.4 min	0.65	5	470	S-MINI
	1SV262	34	10	32	33 to 38	2	2.6 to 3.0	25	12 min	0.6	5	470	USC
	1SV282*[1]												ESC
	1SV269*[1]	34	10	32	29 to 34	2	2.5 to 2.9	25	10.8 min	0.55	5	470	USC
	1SV283B**[1]						2.5 to 3.0		10.6 min				ESC
VHF / UHF Tuning	1SV214*[1]	30	10	28	14.16 to 16.25	1	2.11 to 2.43	25	9.5 to 7.15	0.4	5	470	USC
	1SV278B**[1]					2	2.01 to 2.43		5.9 to 7.28				ESC
UHF Tuning (BS 2nd C / V) (CATV)	1SV245	30	10	28	3.31 to 4.55	2	0.61 to 0.77	25	5.0 min	1.2	1	470	USC
	1SV309												ESC
	1SV287	30	10	28	4.2 to 5.7	2	0.53 to 0.68	25	7.6 typ.	1.9	1	470	USC
	1SV291												ESC
	1SV302	30	10	28	42 to 51	2	2.1 to 3.1	25	17.5 typ.	1.05	5	470	USC
	1SV303												ESC
	JDV2S71U*	30	10	28	6 to 7.2	1	0.49 to 0.64	25	11.5 typ.	1	5	470	USC
	JDV2S71E*												ESC
CATV Conv. OSC	1SV230	30	10	28	13.9 to 16.6	2	1.7 to 2.1	20	7.1 min	0.73	5	470	USC
	1SV286*[1]				14.5 to 16.1		1.56 to 1.86			0.75			ESC
Wideband Tuning (CATV)	1SV288	30	10	28	41 to 49.5	2	2.5 to 3.2	25	16 typ.	0.92	5	470	USC
	1SV290B**[1]												ESC

* New product *[1] Manufactured at an overseas factory

■ Diodes for TV Band Switches

	Part Number	V_R (V)	I_R (μA)	V_R (V)	V_F(MAX) (V)	I_F (mA)	C_T(Typ.)	V_R (V)	rs(Typ.) (Ω)	I_F (mA)	f (MHz)	Package
Single	1SS314*	30	0.1	15	0.85	2	0.7	6	0.5	2	100	USC
	1SS381											ESC
	JDS2S03S						0.8					sESC
Dual	1SS268	30	0.1	15	0.85	2	0.8	6	0.6	2	100	S–MINI
	1SS312*											USM
	1SS364						0.85					SSM
	1SS269	30	0.1	15	0.85	2	0.8	6	0.6	2	100	S–MINI
	1SS313											USM

* Manufactured at an overseas factory

■ PIN Diodes

	Part Number	V_R (V)	I_R (μA)	V_R (V)	V_F(MAX) (V)	I_F (mA)	C_T(Typ.)	V_R (V)	rs(Typ.) (Ω)	I_F (mA)	f (MHz)	Package
Single	1SV128	50	0.1	50	0.95 typ.	50	0.25	50	7	10	100	S–MINI
	1SV271				1				3			USC
	JDP2S04E											ESC
	1SV307	30	0.1	30	1	50	0.3	1	1	10	100	USC
	1SV308											ESC
	JDP2S02AS											sESC
	JDP2S02AFS											fSC
	JDP2S02ACT											CST2
	JDP2S01S	30	0.1	30	0.95	50	0.65	1	0.65	10	100	sESC
	JDP2S05FS	20	0.1	20	0.94	50	0.32	1	1.5	1	100	fSC
	JDP2S05CT											CST2
	JDP2S08SC*	30	0.1	30	0.95	50	0.21	1	1	10	10	SC2
Dual	1SV237	50	0.1	50	0.95 typ.	50	0.25	50	3	10	100	SMQ
	1SV172								4			S–MINI
	1SV252				0.98		0.2		3.5			USM
	1SV312				1		0.25		3			USQ
	JDP4P02U	30	0.1	30	1	50	0.3	1	1	10	100	USQ
	JDP4P02AT											TESQ

* New product

■ SBDs for VHF/UHF Mixers

	Part Number	V_R V_{RM}*1 (V)	I_F (mA)	V_F(Typ.) (V)	I_F (mA)	C_T(Typ.)	V_R (V)	Package
Single	1SS154	6	30	0.5	10	0.8	0	S-MINI
	1SS315	5*1	30	0.25	2	0.6	0.2	USC
	JDH2S01FS	4	2.5	0.25	2	0.6	0.2	fSC
	JDH2S02FS*	10	10	0.24	1	0.3	0.2	fSC
Dual	1SS271	6	30	0.5	10	0.8	0	S-MINI
	1SS295	4	30	0.25	2	0.6	0.2	S-MINI
	JDH3D01S	4	2.5	0.25	2	0.6	0.2	SSM
	JDH3D01FV	4	2.5	0.25	2	0.6	0.2	VESM

* New product

2-4 Radio-Frequency Cell Packs (MMIC)

Toshiba's radio-frequency cell packs integrate multiple discrete devices required for mobile communications equipment, such as amplifiers and mixers, reducing product power consumption, size and design complexity.

Bipolar Linear ICs

Product Lines

Part Number	Package	Function	Application	Electrical Characteristics (Ta = 25°C)
TA4001F	SMQ	Bipolar linear wideband amp	BS tuners, communications equipment, VHF / UHF amps	B/W = 2.4 GHz, Gp = 12.5 dB @f = 500 MHz, Vcc = 5 V
TA4002F	SMQ	Bipolar linear wideband amp	BS tuners, communications equipment, VHF / UHF amps	B/W = 1.3 GHz, Gp = 23 dB @f = 500 MHz, Vcc = 5 V
TA4004F	SMV	Bipolar linear wideband amp	Communications equipment, VHF/UHF amps	B/W = 1.2 GHz, Gp = 10.5 dB @f = 400 MHz, Vcc = 2 V
TA4011AFE	ESV	Bipolar linear wideband amp	Communications equipment, UHF amps	B/W = 2.4 GHz, P_{O1dB} = –6 dBmW @Vcc = 2 V
TA4011FU	USV	Bipolar linear wideband amp	Communications equipment, UHF amps	B/W = 2.4 GHz, P_{O1dB} = –6 dBmW @Vcc = 2 V
TA4012AFE	ESV	Bipolar linear wideband amp	Communications equipment, UHF amps	B/W = 2.0 GHz, P_{O1dB} = 0 dBmW @Vcc = 2 V
TA4012FU	USV	Bipolar linear wideband amp	Communications equipment, UHF amps	B/W = 2.0 GHz, P_{O1dB} = 0 dBmW @Vcc = 2 V
TA4014FT	TU6	Bipolar linear OSC & buffer	TCXO, VCXO	Icc = 1.2 mA @Vcc = 3.0 V Vosc = 1.4 p-p (reference value)
TA4014FE	ES6	Bipolar linear OSC & buffer	TCXO, VCXO	
TA4014FC	CS6	Bipolar linear OSC & buffer	TCXO, VCXO	
TA4015FT	TU6	Bipolar linear OSC & buffer	TCXO, VCXO	Icc = 1.3 mA @Vcc = 3.0 V Vosc = 1.4 p-p (reference value)
TA4015FE	ES6	Bipolar linear OSC & buffer	TCXO, VCXO	
TA4016AFE	ES6	Bipolar linear wideband amp	Communications equipment, UHF amps	B/W = 3.2 GHz, Gp = 19 dB @f = 1.5 GHz, Vcc = 2 V
TA4017FT	TU6	Bipolar differential amp	CATV, IF amps	$\|S_{21}\|^2$ = 13 dB, P_{O1dB} = 2 dBmW @Vcc = 5 V, f = 45 MHz
TA4018F	SM8	Bipolar differential gain control amp	CATV, IF variable amps	$\|S_{21}\|^2$ = 11 dB, G_R = 37 dB @Vcc = 5 V, f = 45 MHz
TA4019F	SM8	Bipolar differential amp	CATV, IF amps	$\|S_{21}\|^2$ = 30 dB, IM3 = 53 dB @Vcc = 5 V, f = 45 MHz, Pin = –35 dBmW
TA4107F	SM8	Bipolar linear downconverter	CATV, analog / digital tuners	C.Gain = –0.5 dB, IIP3 = 12 dBmW @f_{RF} = 1 GHz, f_{LO} = 950 MHz, Vcc = 4.5 V
TA4020FT*	TESQ	SiGe Bipolar linear	UHF band, low-noise amps	Icc = 5 mA, NF = 0.95 dB, $\|S_{21}e\|^2$ = 15 dB @Vcc = 3 V, f = 1.5 GHz
TA4205FC	CS6	Bipolar linear wideband amp	VCO	Combines an oscillator transistor, a buffer transistor and bias resistors in one package. Suitable for 2- to 5-GHz oscillation.
TA4500F*	QS16	SiGe MMIC Low-noise amp and downconversion mixer	PHS phones, digital cordless phones	High conversion gain : G_{LNA} = 17.5 dB(typ.), G_{MIX} = 5 dB(typ.) High IIP3 : $IIP3_{LNA}$ = –7.5 dBmW(typ.), $IIP3_{MIX}$ = 7.0 dBmW(typ.) High 1/2IF Suppression ratio : $1/2IFR_{MIX}$ = 45 dB(typ.) @1.9 GHz, Vcc = 3 V

* New product

GaAs MMIC

Product Lines

Part Number	Package	Function	Application	Electrical Characteristics (Ta = 25°C)
TG2210FT	TU6	SPDT switch	General-purpose RF switch, receiver antenna switch	Loss = 0.4 dB (typ.), ISL = 30 dB (typ.), Pi1 dB = 18 dBmW (min) @f = 1 GHz, Vc = 0 V / 2.7 V
TG2211AFT*	TU6	SPDT switch and inverter	General-purpose RF switch, receiver antenna switch	Loss = 0.5 dB (typ.), ISL = 30 dB (typ.), Pi1 dB = 17 dBmW (min) @f = 2 GHz, V_{DD} / Vc(H) = 2.7 V / 2.7 V
TG2213S	sES6	Small SPDT switch	General-purpose RF switch, receiver antenna switch	Loss = 0.45 dB (typ.), ISL = 24 dB (typ.), Pi1 dB = 12 dBmW (min) @f = 2.5 GHz, Vc = 0 V / 2.7 V
TG2214S	sES6	Small SPDT switch Inverted output of TG2213S	General-purpose RF switch, receiver antenna switch	Loss = 0.45 dB (typ.), ISL = 24 dB (typ.), Pi1 dB = 12 dBmW (min) @f = 2.5 GHz, Vc = 0 V / 2.7 V
TG2216TU	UF6	Medium-power SPDT switch	General-purpose RF switch, PHS, Bluetooth, 2.4-GHz wireless LAN antenna switch	Loss = 0.7 dB (typ.), ISL = 23 dB (typ.), Pi1 dB = 25 dBmW (min) @f = 2.5 GHz, Vc = 0 V / 2.7 V
TG2217CTB*	CST6B	Ultra-small SPDT switch	General-purpose RF switch, receiver antenna switch	Loss = 0.45 dB (typ.), ISL = 22 dB (typ.), Pi1 dB = 14 dBmW (min) @f = 2.5 GHz, Vc = 0 V / 2.6 V
TG2403CT*	CST20	1.9-GHz power amp and SPDT switch	PHS phones, digital cordless phones	PA : Gp ≥ 36 dB, Itotal ≤ 180 mA, @f = 1.92 GHz, Po = 20.5 dBmW, Vgg = per rank SW: $Loss_{RX}$ = 0.5 dB ISL_{TX} = 25 dB ISL_{RX} = 15 dB @f = 1.92 GHz, Vc = 0 V / 3 V

* New product

Radio-Frequency POWER TRANSISTORs

Radio-Frequency Power Transistors

Toshiba provides high-power discrete transistors for HF, VHF and UHF applications. These devices are best suited for high-power amplifiers and boosters.

Radio-Frequency POWER MOSFETs

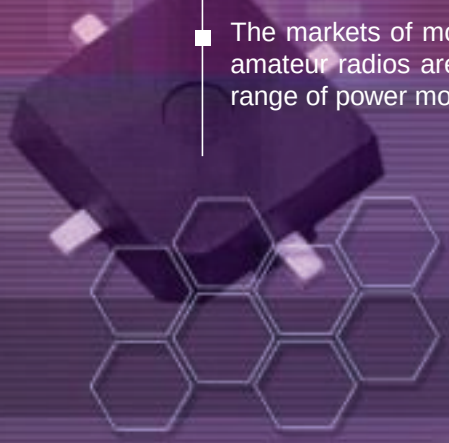
Radio-Frequency Power MOSFETs

Toshiba offers radio-frequency power MOSFETs designed for VHF and UHF TV broadcast transmitters, and transmitter amplifiers for 800-MHz cell phones. Salient features of these devices include high gain and high efficiency.

Radio-Frequency POWER MODULEs

Radio-Frequency Power Modules

The markets of mobile communications systems, car phones and professional and amateur radios are orowing steadily. To meet diverse needs, Toshiba offers a wide range of power modules.



General Characteristics of Radio-Frequency Power Transistors

Applications	Part Number	Maximum Ratings (T_C = 25°C)			P_O(W)				Package
						Test Conditions			
		V_{CBO} (V)	P_C (W)	I_C (A)	Min	V_{CC} (V)	f (MHz)	P_i (W)	
27 to 50 MHz CB Radios Amateur Radios	2SC2290A	45	175	20	60 PEP	12.5	28	4 PEP	**2–13B1A**
	2SC2879A	45	250	25	80 PEP	12.5	28	8 PEP	**2–13B1A**
	2SC2510A	60	250	20	150 PEP	28	28	9 PEP	**2–13B1A**
175 MHz Marine Radios Professional Radios Amateur Radios	2SC2782A	36	220	20	80	12.5	175	18	**2–13C1A**

General Characteristics of Radio-Frequency Power MOSFETs

Applications		Part Number	Maximum Ratings (T_C = 25°C)			P_O Min (W)	Efficiency (Min)	Test Conditions			Package
			V_{DSS} (V)	P_C (W)	I_D (A)			V_{DD} (V)	f (MHz)	P_i (W)	
TV Broadcasting	VHF	2SK1310A	100	250	12	190	65 %(typ.)	50	230	10	**2–22C2A**
	UHF	2SK1739A	80	250	11	90	50 %(typ.)	40	770	10	**2–22C2A**
Cell Phones		2SK2854	10	0.5	0.5	0.2	40 %	6	849	0.02	**PW–MINI**
		2SK2855	10	0.5	1	1.26	55 %	6	849	0.2	**PW–MINI**
Radio Transmitters		2SK3074	30	3	1	0.63	45 %	9.6	520	0.02	**PW–MINI**
		2SK3075	30	20	5	7.5	50 %	9.6	520	0.5	**PW–X**
Family Radio Service (FRS)		2SK3078A	10	3	0.5	0.63	50 %	4.5	470	0.1	**PW–MINI**
		2SK3656	7.5	3	0.5	0.5	50 %	3.6	470	0.02	**PW–MINI**
		2SK3079A	10	20	3	2.24	50 %	4.5	470	0.1	**PW–X**
Gereral Mobile Radio Service (GMRS)		2SK3756	7.5	3	1	1.26	50 %	4.5	470	0.1	**PW–MINI**
Radios		2SK3475	20	3	1	0.63	45 %	7.2	520	0.02	**PW–MINI**
		2SK3476	20	20	3	7	60 %	7.2	520	0.5	**PW–X**

Packaging

2-13B1A

2-13C1A

USQ　PW-X　PW-MINI

2-22C2A

■ Radio-Frequency Power Modules by Product Number (for Analog Applications)

Applications		Part Number	Frequency Range	Characteristics			Test Conditions		Package*1
			f (MHz)	PO (W)	η_T (%)	ρ_i (–)	Pi (mW)	VCC (V)	
VHF	**50W FM** Professional Radios	**S-AV32**	134 to 174	60	45	3	50	5/12.5	5-53P
	25W FM Professional Radios	**S-AV33**	134 to 174	32	45	3	50	5/12.5	5-53P
	25W FM Marine Radios	**S-AV35**	154 to 162	32	50	3	10	5/12.5	5-32G
	65W FM Professional Radios	**S-AV36**	134 to 174	80	45	3	50	5/12.5	5-53P
	25W FM Marine Radios	**S-AV37**	154 to 162	32	50	3	10	5/12.5	5-32G
UHF	**5W FM** Handheld Professional Radios	**S-AU50L**	400 to 430	7	40	3	50	4/9.6	5-23E
		S-AU50M	430 to 480	7	40	2.5	50	4/9.6	5-23E
		S-AU50H	470 to 520	6.5	40	4.5	50	4/9.6	5-23E
	5W FM Handheld Amateur Radios	**S-AU57**	430 to 450	7	40	3	20	4/9.6	5-23E
	5W FM Handheld Professional Radios	**S-AU68L**	400 to 420	7	35*	5*	20	4/9.6	5-23E
		S-AU68M	450 to 470	7	40*	2.5*	20	4/9.6	5-23E
	50W FM Professional Radios	**S-AU82VL**	378 to 440	60	40	3	50	5/12.5	5-53P
		S-AU82L	400 to 470	60	40	3	50	5/12.5	5-53P
		S-AU82H	450 to 520	60	40	3	50	5/12.5	5-53P
	25W FM Professional Radios	**S-AU83L**	400 to 470	32	40	3	50	5/12.5	5-53P
		S-AU83H	450 to 520	32	40	3	50	5/12.5	5-53P
	50W FM Professional Radios	**S-AU93**	430 to 500	60	40	3	50	5/12.5	5-53P
	5W FM Handheld Professional Radios	**S-AU94**	450 to 490	7.55	40	4.5	20	4/9.6	5-23E

* @Po = 7 W *1 See page 51 for package outline diagrams.

■ Radio-Frequency Power Modules by Product Number (for Digital Applications)

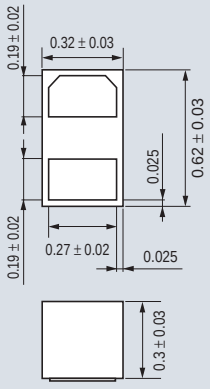
Applications	Part Number	Frequency Range	Characteristics		Test Conditions		Package
		f (MHz)	PO (dBmW)	ACP (dB)	VCC (V)	ICC (A)	
Professional Radios	**S-AV34***	150 to 165	39	–34	10.8	2.8	5-32F
	S-AV38*	260 to 266	35	–35	7.2	1.7	5-23E
Professional Radios (Japan Digital MCA)	**S-AU86***	889 to 915	35	–39	12	1.7	5-28C

* Modulating signal π / 4 DQPSK (α = 0.5, 32 kbps), Bandwidth : 16 kHz, Detuning frequency : 25 kHz

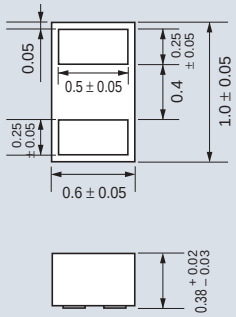
2-Pin Packages

Unit: mm

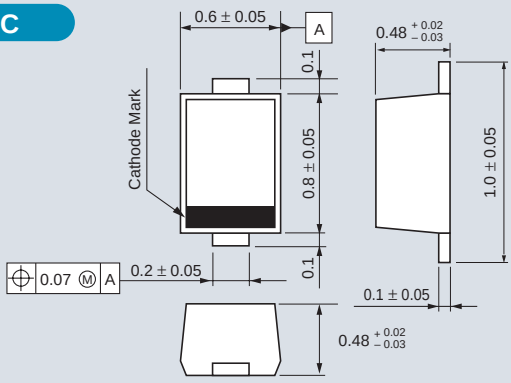
SC2



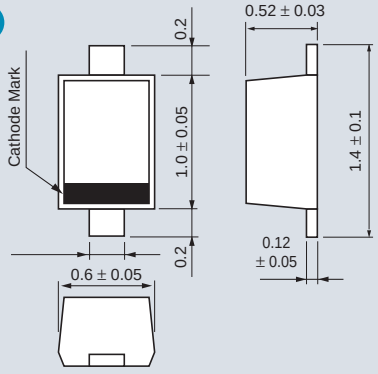
CST2



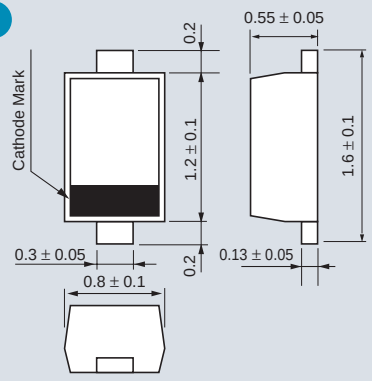
fSC



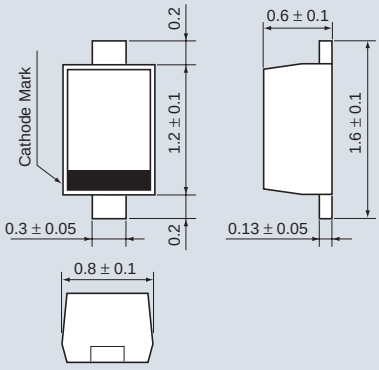
sESC



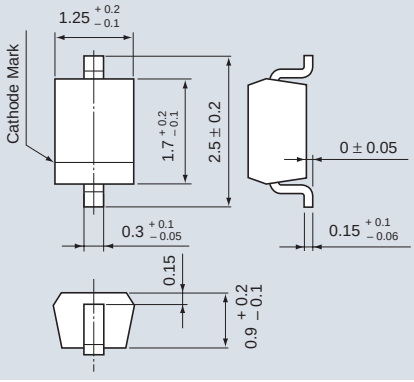
TESC



ESC



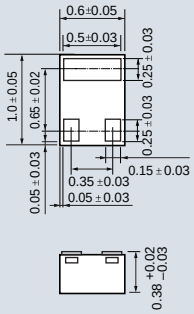
USC



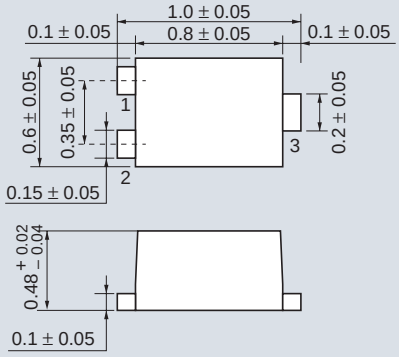
3-Pin Packages

Unit: mm

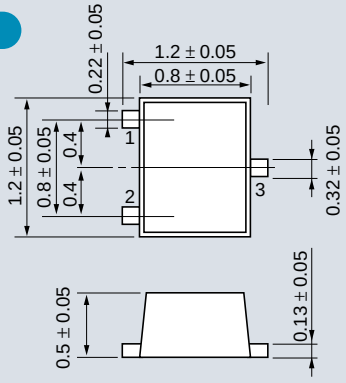
CST3



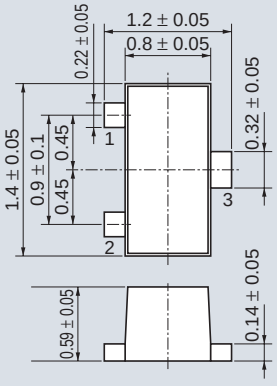
fSM



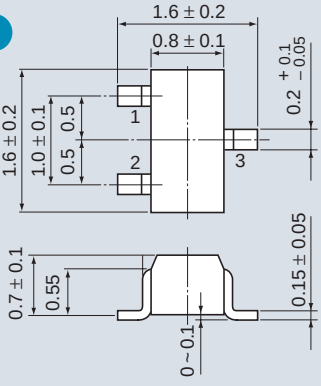
VESM



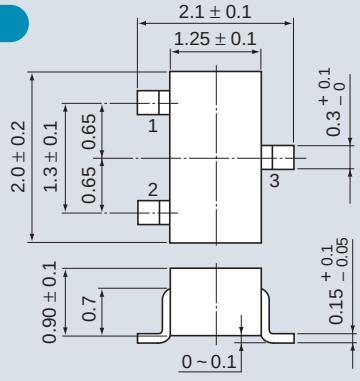
TESM



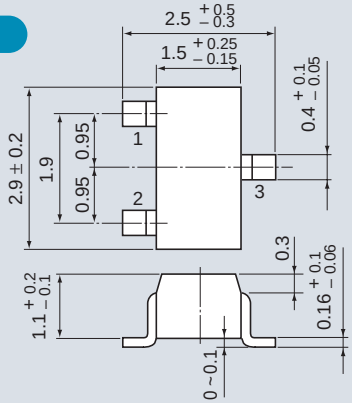
SSM



USM



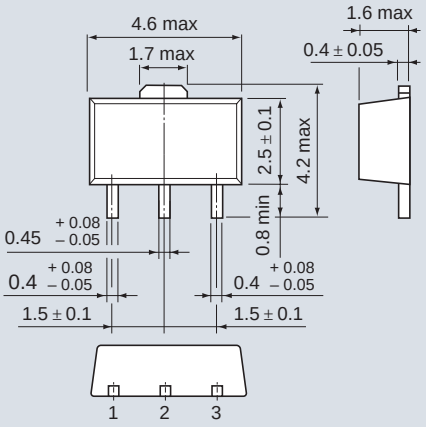
S-MINI



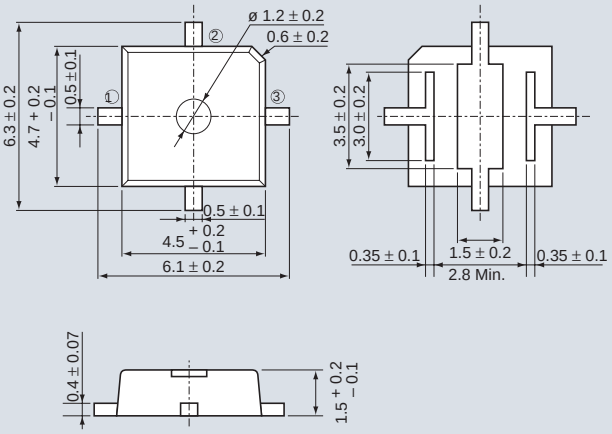
3-, 4- and 5-Pin Packages

Unit: mm

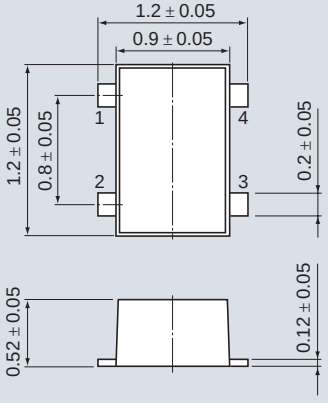
PW-MINI



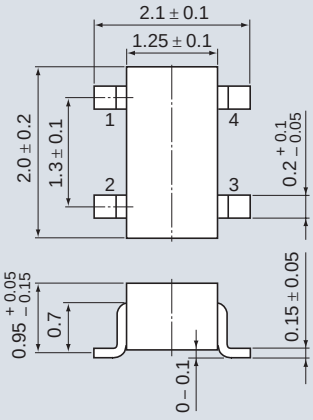
PW-X



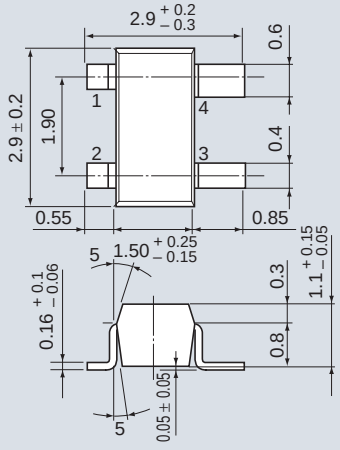
TESQ



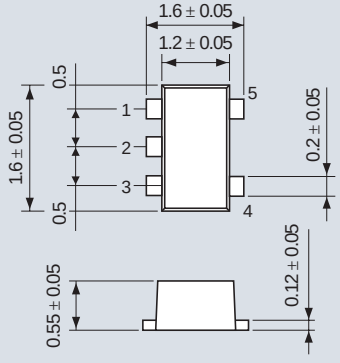
USQ



SMQ



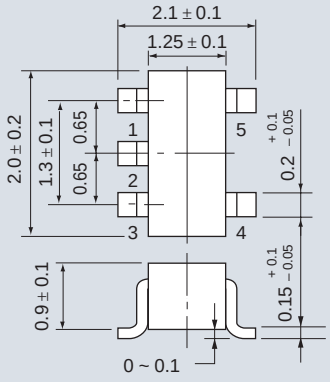
ESV



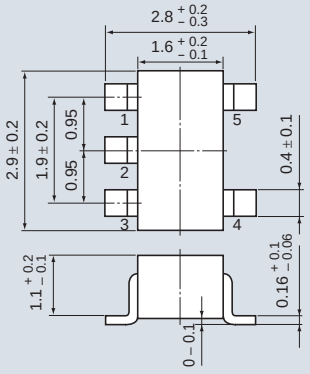
5- and 6-Pin Packages

Unit: mm

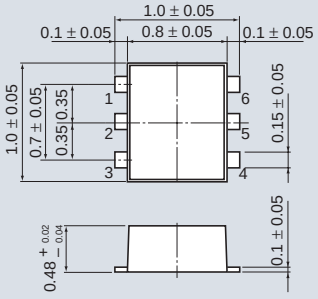
USV



SMV



fS6



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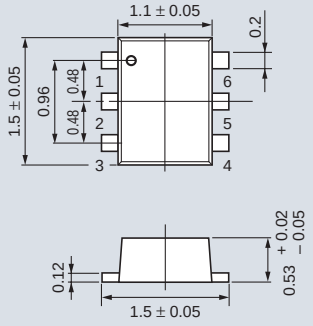

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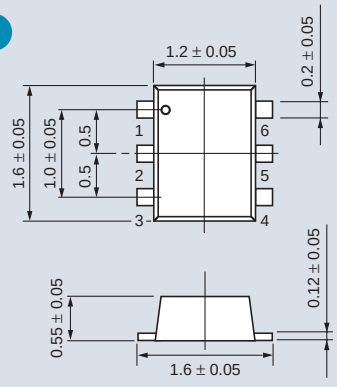

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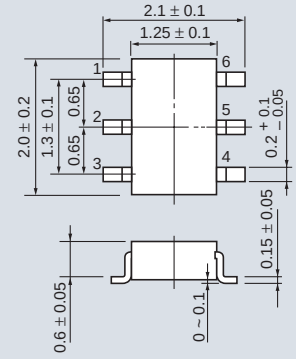
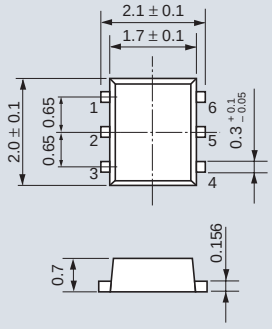


UF6



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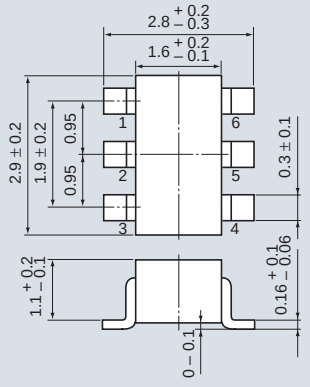
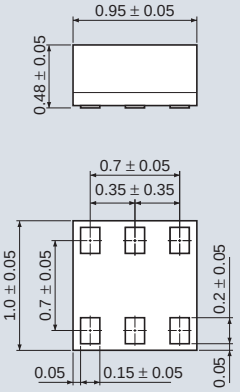


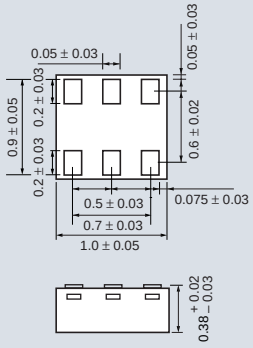
6-, 8- and 20-Pin Packages

Unit: mm

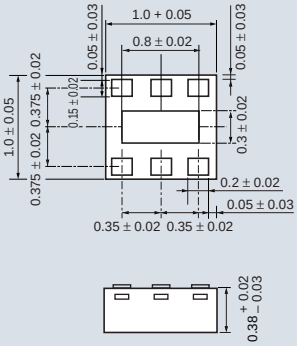
CS6



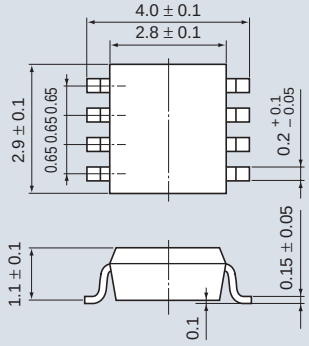
CST6



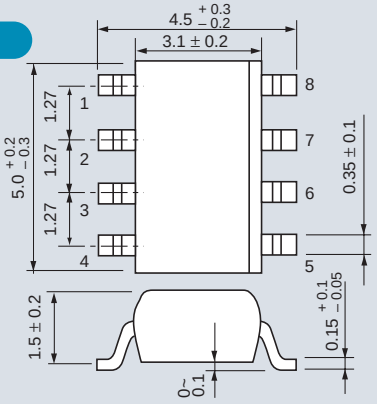
CST6B



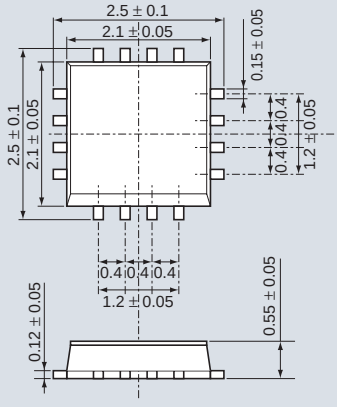
SM8



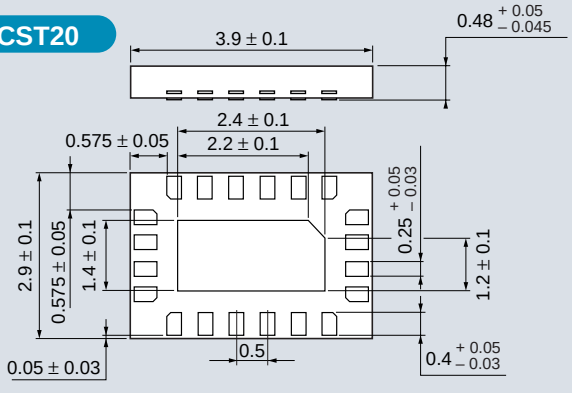
FM8



QS16



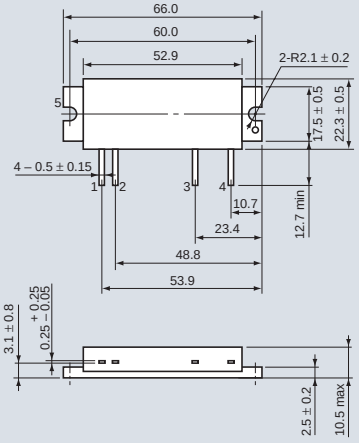
CST20



Radio-Frequency Power Modules

Unit: mm

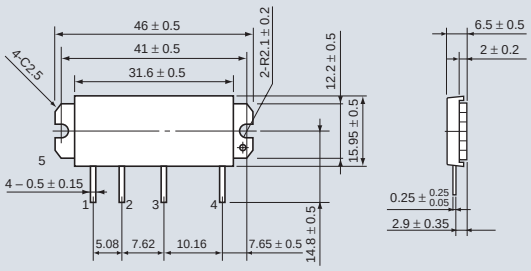
5-53P



1. Radio-frequency input
2. V_{CON}
3. V_{CC}
4. Radio-frequency output
5. Ground (flange)

5-32F

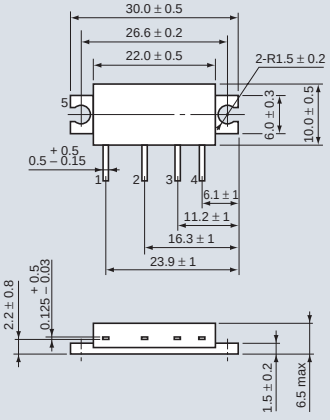
From bottom of leads to bottom of flange



Lead pitch tolerance: ± 0.15mm

1. Radio-frequency input
2. V_{CON}
3. V_{CC}
4. Radio-frequency output
5. Ground (flange)

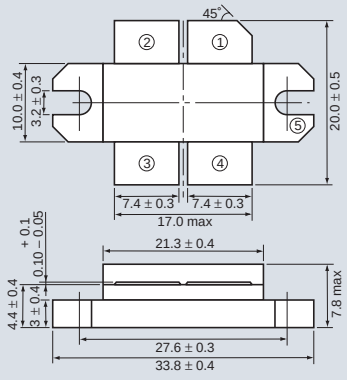
5-23E



1. Radio-frequency input
2. V_{GG}
3. V_{DD}
4. Radio-frequency output
5. Ground (flange)

Radio-Frequency Power MOSFET

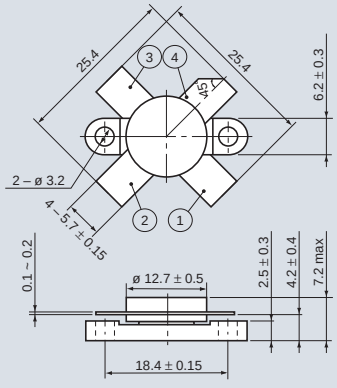
2-22C2A



1. Drain
2. Drain
3. Gate
4. Gate
5. Source

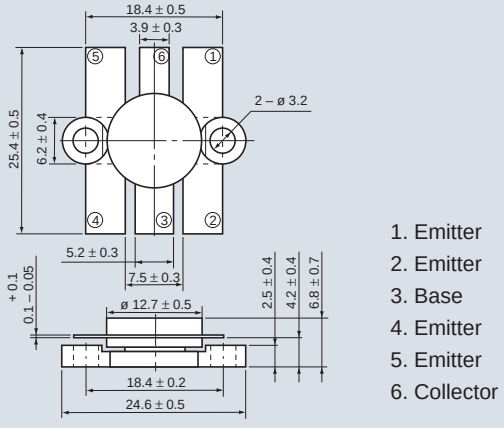
Radio-Frequency Power MOSFETs/Transistors

2-13B1A



1. Emitter
2. Base
3. Emitter
4. Collector

2-13C1A



1. Emitter
2. Emitter
3. Base
4. Emitter
5. Emitter
6. Collector

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(As of April 1, 2005)

2005-9

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