TOSHIBA Field-Effect Transistor Silicon N-Channel MOS Type

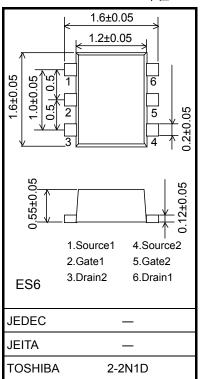
SSM6N37FE

- High-Speed Switching Applications
- Analog Switching Applications
- 1.5-V drive
- Suitable for high-density mounting due to compact package
- Low ON-resistance $R_{DS(ON)} = 5.60 \Omega \text{ (max)} (@V_{GS} = 1.5 \text{ V})$
 - $R_{DS(ON)} = 4.05 \Omega (max) (@V_{GS} = 1.8 V)$ $R_{DS(ON)} = 3.02 \Omega (max) (@V_{GS} = 2.5 V)$

 $R_{DS(ON)} = 2.20 \Omega (max) (@V_{GS} = 4.5 V)$

Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common)

Characteristic		Symbol	Rating	Unit	
Drain-source voltage		V _{DSS}	20	V	
Gate-source voltage		V _{GSS}	± 10	V	
Drain current	DC	I _D	250	mA	
	Pulse	I _{DP}	500		
Drain power dissipation		P _D (Note 1)	150	mW	
Channel temperature		T _{ch}	150	°C	
Storage temperature		T _{stg}	–55 to 150	°C	



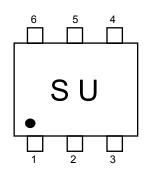
Weight: 3.0 mg (typ.)

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in

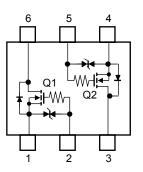
temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating Mounted on an FR4 board (25.4 mm \times 25.4 mm \times 1.6 mm, Cu Pad: 0.135 mm² \times 6)

Marking



Equivalent Circuit (top view)



単位: mm

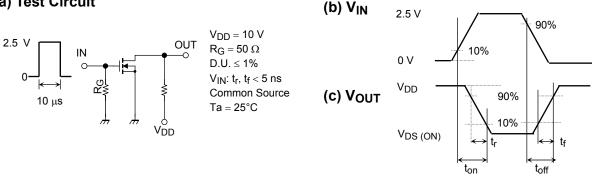
Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

Char	acteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Drain-source breakdown voltage		V (BR) DSS	$I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}$	20	_	_	- V
		V (BR) DSX	I _D = 1 mA, V _{GS} = -10 V	12			
Drain cutoff currer	nt	I _{DSS}	$V_{DS} = 20 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$	_		1	μA
Gate leakage curr	ent	I _{GSS}	$V_{GS} = \pm 10 \text{ V}, \text{ V}_{DS} = 0 \text{ V}$			±1	μA
Gate threshold vol	tage	V _{th}	$V_{DS} = 3 V, I_D = 1 mA$	0.35		1.0	V
Forward transfer a	idmittance	Y _{fs}	$V_{DS} = 3 V, I_D = 100 mA$ (Note 2)	0.14	0.28		S
		R _{DS} (ON)	$I_D = 100 \text{ mA}, V_{GS} = 4.5 \text{ V}$ (Note 2)	_	1.65	2.20	- Ω
			$I_D = 50 \text{ mA}, V_{GS} = 2.5 \text{ V}$ (Note 2)	_	2.16	3.02	
Drain-source ON-resistance	$I_D = 20 \text{ mA}, V_{GS} = 1.8 \text{ V}$ (Note 2)		_	2.66	4.05		
			$I_D = 10 \text{ mA}, V_{GS} = 1.5 \text{ V}$ (Note 2)	_	3.07	5.60	
Input capacitance		C _{iss}		_	12		pF
Output capacitance		C _{oss}	$V_{DS} = 10 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ f} = 1 \text{ MHz}$	_	5.5		
Reverse transfer capacitance		C _{rss}		_	4.1	_	
Switching time	Turn-on time	t _{on}	V _{DD} = 10 V, I _D = 100 mA	_	18		ns
	Turn-off time	t _{off}	V_{GS} = 0 to 2.5 V, R_{G} = 50 Ω	_	36	—	
Drain-source forward voltage		V _{DSF}	$I_D = -250 \text{ mA}, V_{GS} = 0 \text{ V}$ (Note 2)	_	-0.9	-1.2	V

Note 2: Pulse test

Switching Time Test Circuit (Q1, Q2 Common)

(a) Test Circuit



Precaution

Let V_{th} be the voltage applied between gate and source that causes the drain current (I_D) to be low (1mA for the SSM6N37FE). Then, for normal switching operation, V_{GS(on)} must be higher than V_{th}, and V_{GS(off)} must be lower than V_{th.} This relationship can be expressed as: V_{GS(off)} < V_{th} < V_{GS(on)}.

Take this into consideration when using the device.

Do not use this device under avalanche mode. It may cause the device to break down.

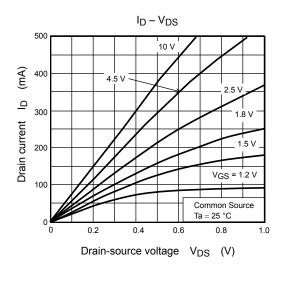
Handling Precaution

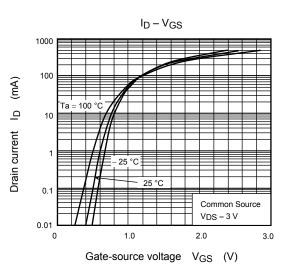
When handling individual devices that are not yet mounted on a circuit board, make sure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic materials.

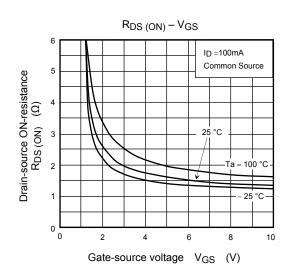
Thermal resistance Rth (i-a) and drain power dissipation PD vary depending on board material, board area, board thickness and pad area. When using this device, please take heat dissipation into consideration.

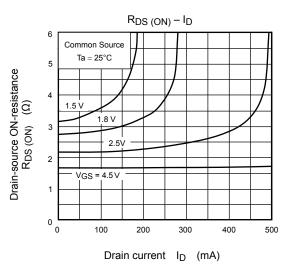
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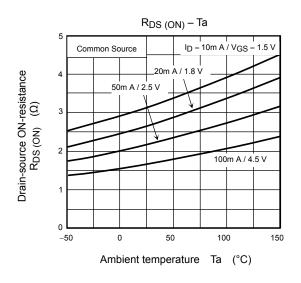
(Q1, Q2 Common)

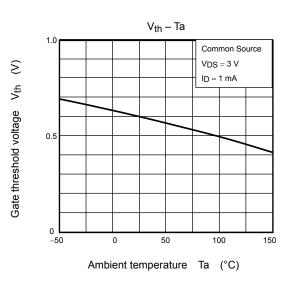






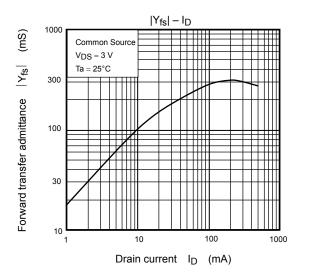


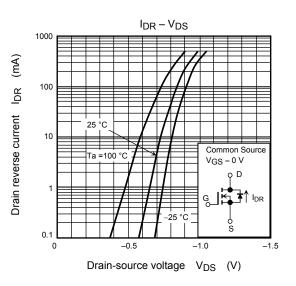


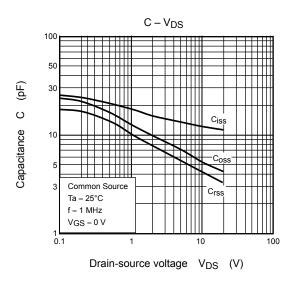


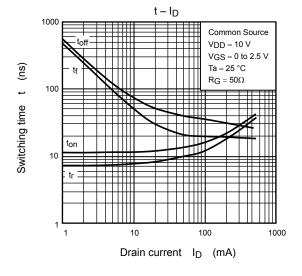
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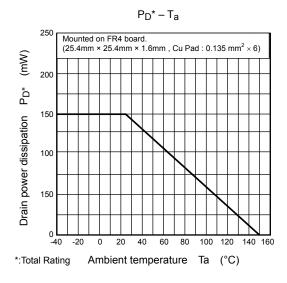
(Q1, Q2 Common)











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