TOSHIBA Field-Effect Transistor Silicon N-Channel MOS Type

SSM6N36FE

High-Speed Switching Applications

• 1.5-V drive

• Low ON-resistance: $R_{on} = 1.52 \Omega \text{ (max)} (@V_{GS} = 1.5 \text{ V})$

: $R_{on} = 1.14 \Omega (max) (@V_{GS} = 1.8 V)$

: R_{on} = 0.85 Ω (max) (@V_{GS} = 2.5 V)

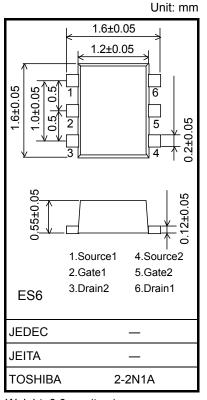
: $R_{on} = 0.66 \Omega \text{ (max) } (@V_{GS} = 4.5 \text{ V})$

: $R_{on} = 0.63 \Omega \text{ (max) (@V}_{GS} = 5.0 \text{ V)}$

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

Characteristics		Symbol	Rating	Unit	
Drain-source voltage		V_{DSS}	20	V	
Gate-source voltage		V_{GSS}	± 10	V	
Drain current	DC	I _D	500	mA	
	Pulse	I _{DP}	1000		
Drain power dissipation		P _D (Note 1)	150	mW	
Channel temperature		T _{ch}	150	°C	
Storage temperature		T _{stg}	-55 to 150	°C	

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.



Weight: 3.0 mg (typ.)

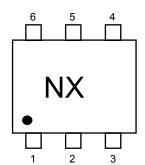
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total rating

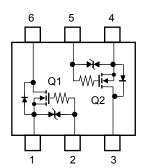
Mounted on an FR4 board

 $(25.4 \text{ mm} \times 25.4 \text{ mm} \times 1.6 \text{ mm}, \text{ Cu Pad: } 0.135 \text{ mm}^2 \times 6)$

Marking



Equivalent Circuit (top view)



Start of commercial production 2008-02

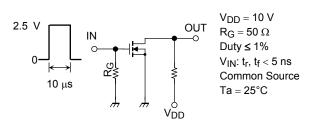
Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

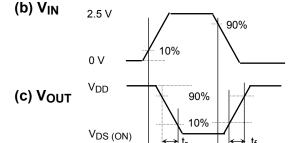
Chara	acteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Drain gourge brookdown voltage	V (BR) DSS	$I_D = 1 \text{ mA}, V_{GS} = 0$	20	_	_	V	
Drain-source breakdown voltage		V (BR) DSX	I _D = 1 mA, V _{GS} = - 10 V	12		_]
Drain cutoff curren	t	I _{DSS}	$V_{DS} = 20 \text{ V}, V_{GS} = 0$	_		1	μА
Gate leakage curre	ent	I _{GSS}	$V_{GS} = \pm 10 \text{ V}, V_{DS} = 0$	_	_	±1	μА
Gate threshold volt	tage	V _{th}	$V_{DS} = 3 V$, $I_D = 1 mA$	0.35	_	1.0	V
Forward transfer a	dmittance	Y _{fs}	$V_{DS} = 3 \text{ V}, I_D = 200 \text{ mA}$ (Note2)	420	840	_	mS
	R _{DS} (ON)	$I_D = 200 \text{ mA}, V_{GS} = 5.0 \text{ V}$ (Note2)	_	0.46	0.63	Ω	
		$I_D = 200 \text{ mA}, V_{GS} = 4.5 \text{ V}$ (Note2)	_	0.51	0.66		
Drain-source ON-resistance		$I_D = 200 \text{ mA}, V_{GS} = 2.5 \text{ V}$ (Note2)	_	0.66	0.85		
		$I_D = 100 \text{ mA}, V_{GS} = 1.8 \text{ V}$ (Note2)	_	0.81	1.14		
		$I_D = 50 \text{ mA}, V_{GS} = 1.5 \text{ V}$ (Note2)	_	0.95	1.52		
Input capacitance		C _{iss}		_	46	_	pF
Output capacitance		Coss	V _{DS} = 10 V, V _{GS} = 0, f = 1 MHz	_	10.8	_	
Reverse transfer capacitance		C _{rss}		_	7.3	_	
Total Gate Charge		Qg		_	1.23	_	
Gate-Source Charge		Q _{gs}	V_{DS} = 10V, I_{D} = 0.5 A, V_{GS} = 4.0 V	_	0.60	_	nC
Gate-Drain Charge		Q _{gd}		_	0.63	_	
Switching time	Turn-on time	t _{on}	V _{DD} = 10 V, I _D = 200 mA	_	30	_	- ns
	Turn-off time	t _{off}	$V_{GS} = 0$ to 2.5 V, $R_G = 50 \Omega$	_	75	_	
Drain-source forward voltage		V _{DSF}	$I_D = -0.5 \text{ A}, V_{GS} = 0 \text{ V}$ (Note2)	_	-0.88	-1.2	V

Note2: Pulse test

Switching Time Test Circuit (Q1, Q2 Common)







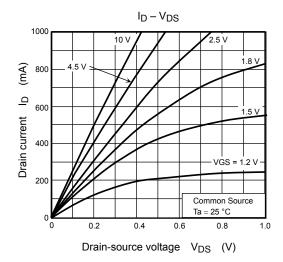
Usage Considerations

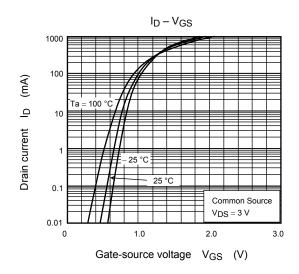
Let V_{th} be the voltage applied between gate and source that causes the drain current (I_D) to below (1 mA for the SSM6N36FE). Then, for normal switching operation, $V_{GS(on)}$ must be higher than V_{th} , and $V_{GS(off)}$ must be lower than V_{th} . This relationship can be expressed as: $V_{GS(off)} < V_{th} < V_{GS(on)}$. Take this into consideration when using the device.

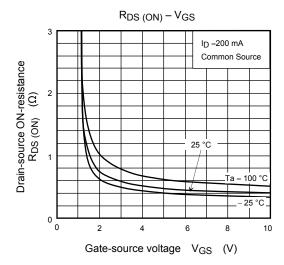
Handling Precaution

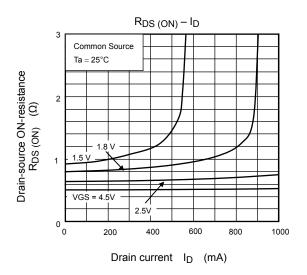
When handling individual devices that are not yet mounted on a circuit board, make sure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic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

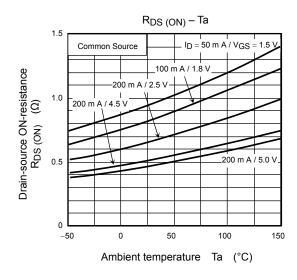
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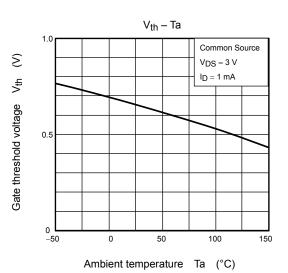


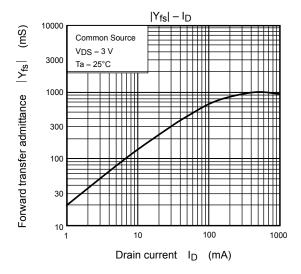


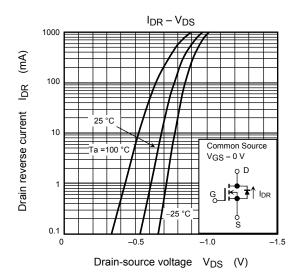


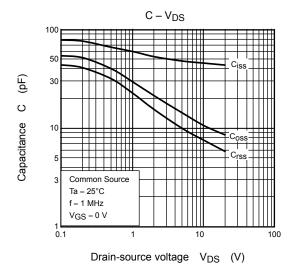


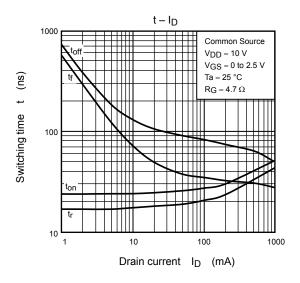


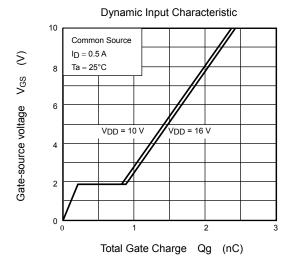


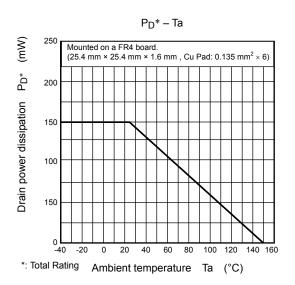












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