

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

SSM6N15FE

High Speed Switching Applications

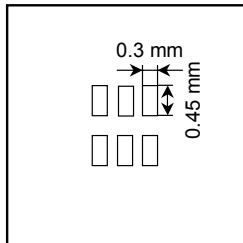
Analog Switching Applications

- Small package
- Low ON resistance : $R_{on} = 4.0 \Omega$ (max) (@ $V_{GS} = 4 V$)
: $R_{on} = 7.0 \Omega$ (max) (@ $V_{GS} = 2.5 V$)

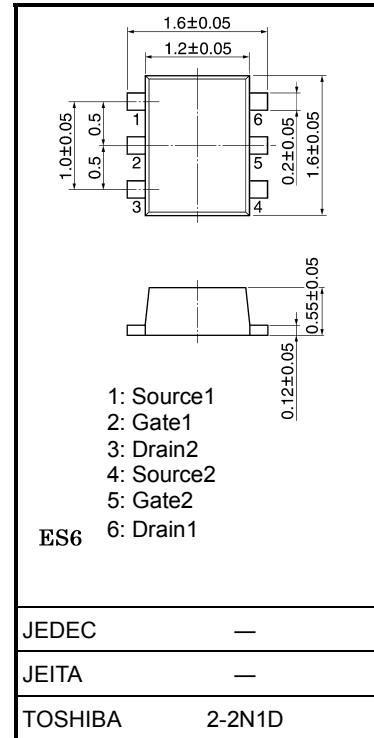
Maximum Ratings ($T_a = 25^\circ C$) (Q1, Q2 Common)

Characteristics	Symbol	Rating	Unit
Drain-Source voltage	V_{DS}	30	V
Gate-Source voltage	V_{GSS}	± 20	V
Drain current	DC	I_D	mA
	Pulse	I_{DP}	
Drain power dissipation ($T_a = 25^\circ C$)	P_D (Note)	150	mW
Channel temperature	T_{ch}	150	$^\circ C$
Storage temperature range	T_{stg}	$-55 \sim 150$	$^\circ C$

Note: Total rating, mounted on FR4 board
($25.4 \text{ mm} \times 25.4 \text{ mm} \times 1.6 \text{ t}$, Cu Pad: $0.135 \text{ mm}^2 \times 6$)

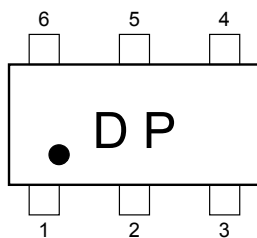


Unit: mm

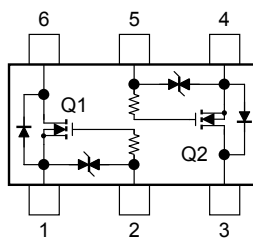


Weight: 3mg (typ.)

Marking



Equivalent Circuit (top view)



Handling Precaution

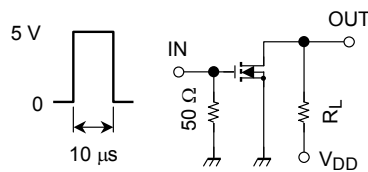
When handling individual devices (which are not yet mounting on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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

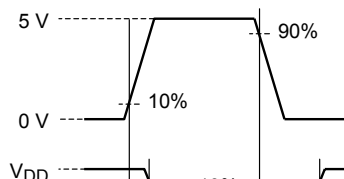
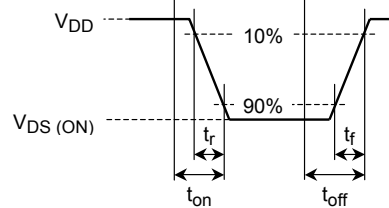
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$	—	—	± 1	μA
Drain-Source breakdown voltage	$V_{(BR)DSS}$	$I_D = 0.1 \text{ mA}, V_{GS} = 0$	30	—	—	V
Drain cut-off current	I_{DSS}	$V_{DS} = 30 \text{ V}, V_{GS} = 0$	—	—	1	μA
Gate threshold voltage	V_{th}	$V_{DS} = 3 \text{ V}, I_D = 0.1 \text{ mA}$	0.8	—	1.5	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 3 \text{ V}, I_D = 10 \text{ mA}$	25	—	—	mS
Drain-Source ON resistance	$R_{DS(ON)}$	$I_D = 10 \text{ mA}, V_{GS} = 4 \text{ V}$	—	2.2	4.0	Ω
		$I_D = 10 \text{ mA}, V_{GS} = 2.5 \text{ V}$	—	4.0	7.0	
Input capacitance	C_{iss}	$V_{DS} = 3 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	7.8	—	pF
Reverse transfer capacitance	C_{rss}		—	3.6	—	pF
Output capacitance	C_{oss}		—	8.8	—	pF
Switching time	Turn-on time	$V_{DD} = 5 \text{ V}, I_D = 10 \text{ mA},$ $V_{GS} = 0 \sim 5 \text{ V}$	—	50	—	ns
	Turn-off time		—	180	—	

Switching Time Test Circuit

(a) Test circuit



$V_{DD} = 5 \text{ V}$
 Duty $\leq 1\%$
 V_{IN} : $t_r, t_f < 5 \text{ ns}$
 $(Z_{out} = 50 \Omega)$
 Common Source
 $T_a = 25^\circ\text{C}$

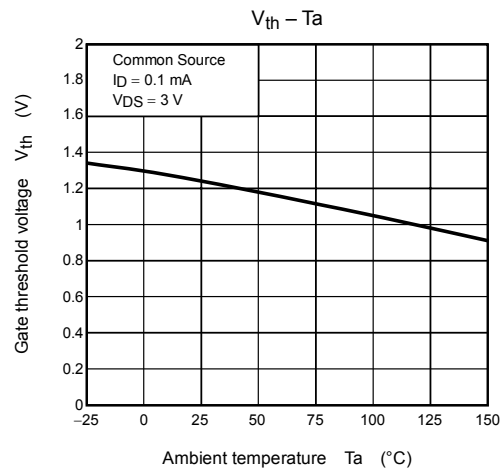
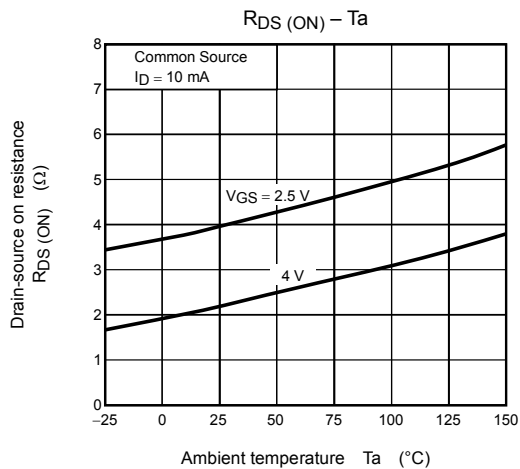
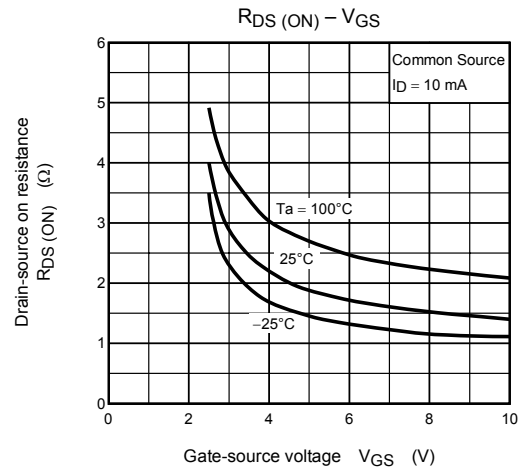
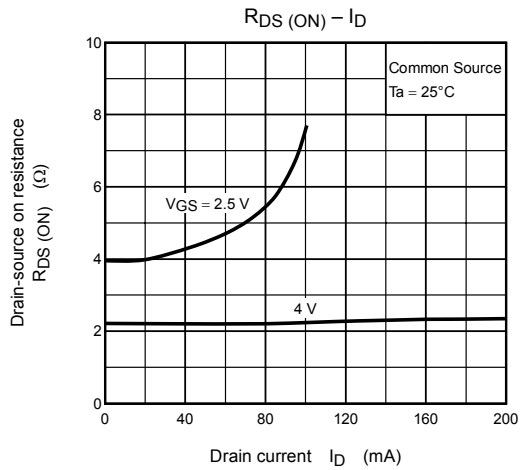
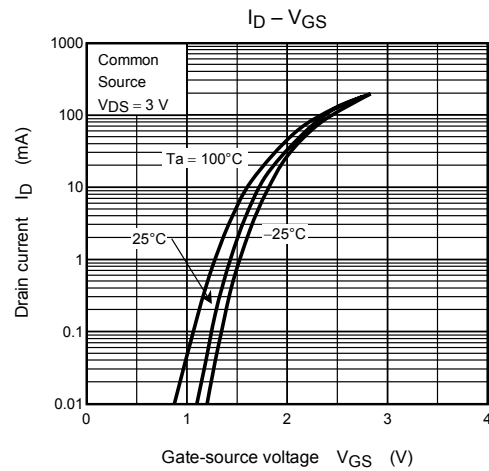
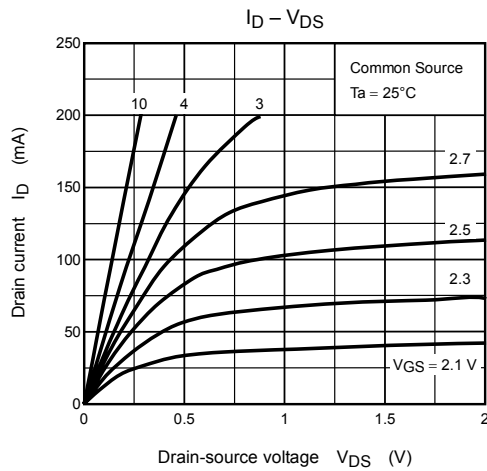
(b) V_{IN} (c) V_{OUT} 

Precaution

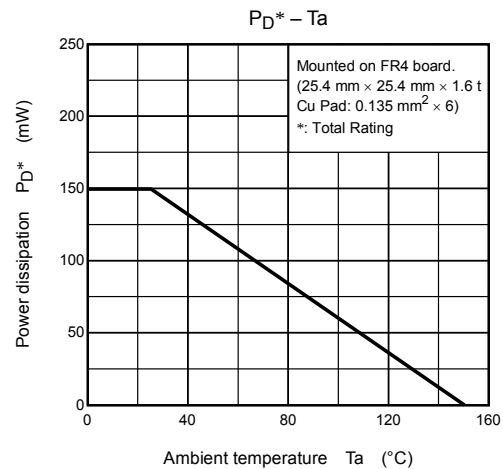
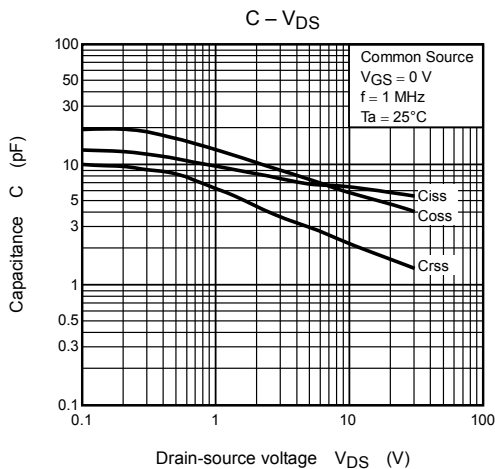
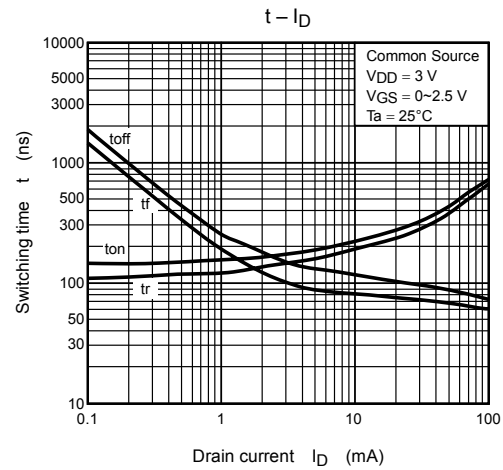
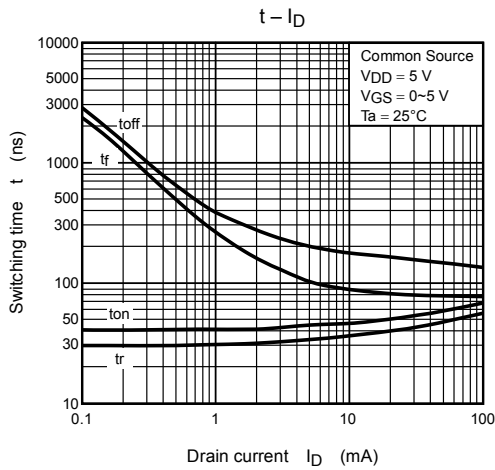
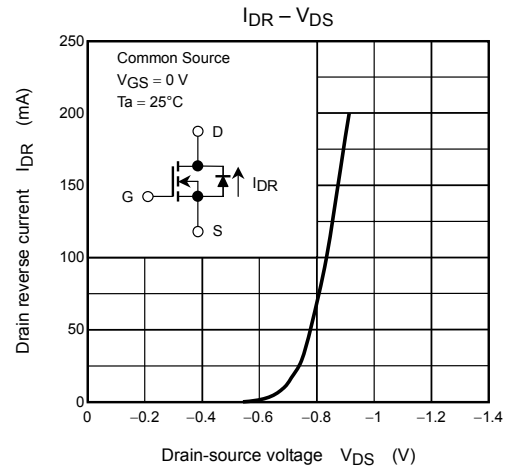
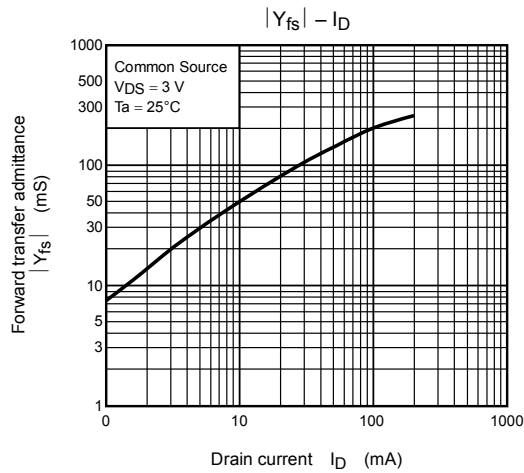
V_{th} can be expressed as voltage between gate and source when low operating current value is $I_D = 100 \mu\text{A}$ for this product. For normal switching operation, $V_{GS(ON)}$ requires higher voltage than V_{th} and $V_{GS(OFF)}$ requires lower voltage than V_{th} . (Relationship can be established as follows: $V_{GS(OFF)} < V_{th} < V_{GS(ON)}$)

Please take this into consideration for using the device. V_{GS} recommended voltage of 2.5 V or higher to turn on this product.

(Q1, Q2 Common)



(Q1, Q2 Common)



*: Total rating

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