

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type

SSM5P15FE

High Speed Switching Applications

Analog Switch Applications

- Small package
- Low ON resistance : $R_{on} = 12 \Omega$ (max) (@ $V_{GS} = -4$ V)
: $R_{on} = 32 \Omega$ (max) (@ $V_{GS} = -2.5$ V)

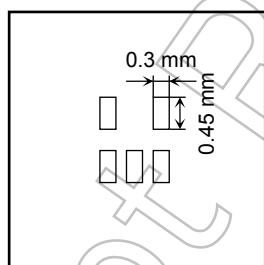
Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common)

Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V _{DS}	-30	V
Gate-Source voltage		V _{GSS}	±20	V
Drain current	DC	I _D	-100	mA
	Pulse	I _{DP}	-200	
Power dissipation (Ta = 25°C)		P _D (Note 1)	150	mW
Channel temperature		T _{ch}	150	°C
Storage temperature range		T _{stg}	-55 to 150	°C

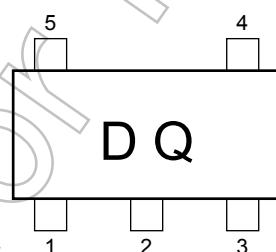
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

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).

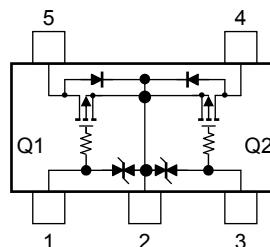
Note 1: Total rating, mounted on FR4 board
(25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 0.135 mm² × 5)



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.

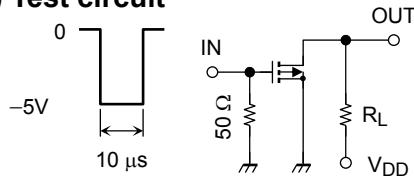
Start of commercial production
2002-03

Electrical Characteristics ($T_a = 25^\circ\text{C}$) (Q1, Q2 common)

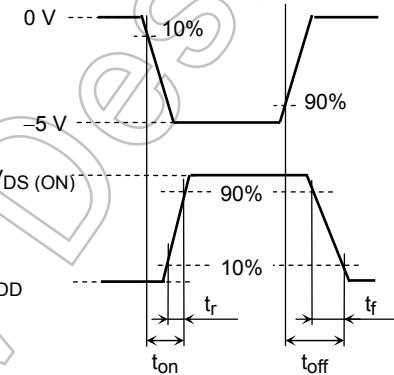
Characteristic	Symbol	Test Condition	MIN	TYP.	MAX	UNIT
Gate leakage current	I_{GSS}	$V_{GS} = \pm 16\text{ V}$, $V_{DS} = 0$	—	—	± 1	μA
Drain-Source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = -0.1\text{ mA}$, $V_{GS} = 0$	-30	—	—	V
Drain cut-off current	I_{DSS}	$V_{DS} = -30\text{ V}$, $V_{GS} = 0$	—	—	-1	μA
Gate threshold voltage	V_{th}	$V_{DS} = -3\text{ V}$, $I_D = -0.1\text{ mA}$	-1.1	—	-1.7	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = -3\text{ V}$, $I_D = -10\text{ mA}$	20	—	—	mS
Drain-Source ON resistance	$R_{DS(\text{ON})}$	$I_D = -10\text{ mA}$, $V_{GS} = -4\text{ V}$	—	8	12	Ω
		$I_D = -1\text{ mA}$, $V_{GS} = -2.5\text{ V}$	—	14	32	
Input capacitance	C_{iss}	$V_{DS} = -3\text{ V}$, $V_{GS} = 0$, $f = 1\text{ MHz}$	—	9.1	—	pF
Reverse transfer capacitance	C_{rss}		—	3.5	—	pF
Output capacitance	C_{oss}		—	8.6	—	pF
Switching time	Turn-on time	t_{on}	$V_{DD} = -5\text{ V}$, $I_D = -10\text{ mA}$, $V_{GS} = 0$ to -5 V	65	—	ns
	Turn-off time	t_{off}		175	—	

Switching Time Test Circuit

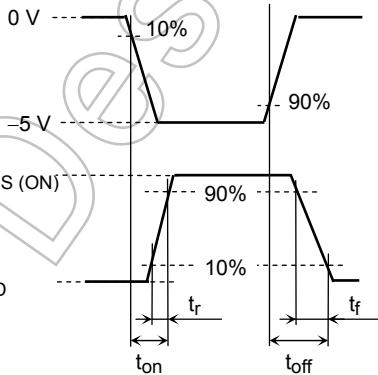
(a) Test circuit



$V_{DD} = -5\text{ V}$
 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}

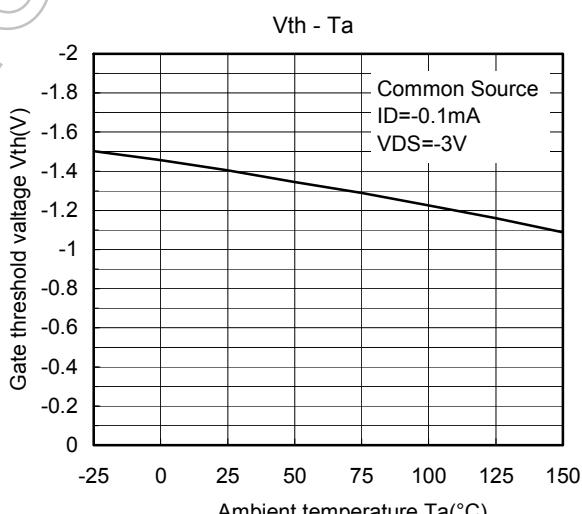
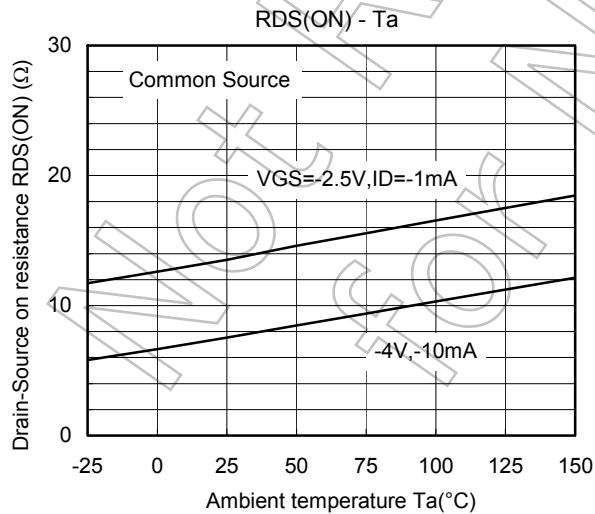
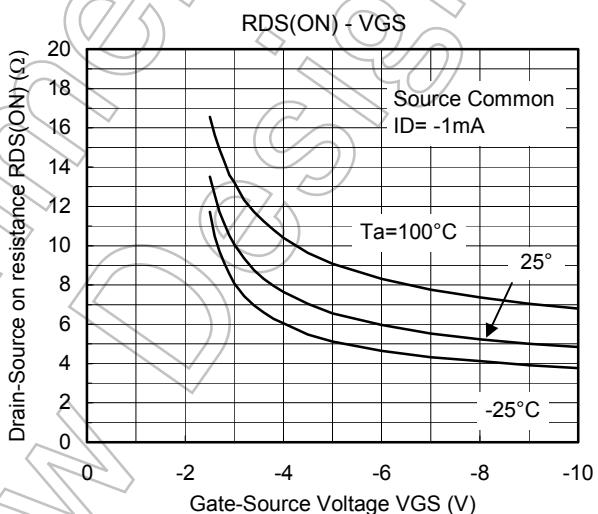
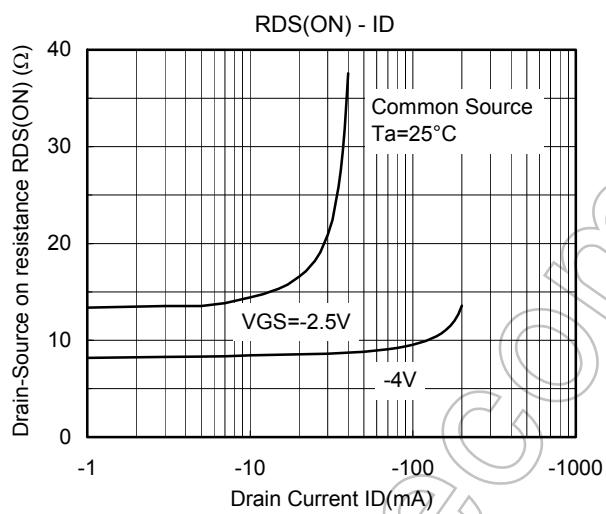
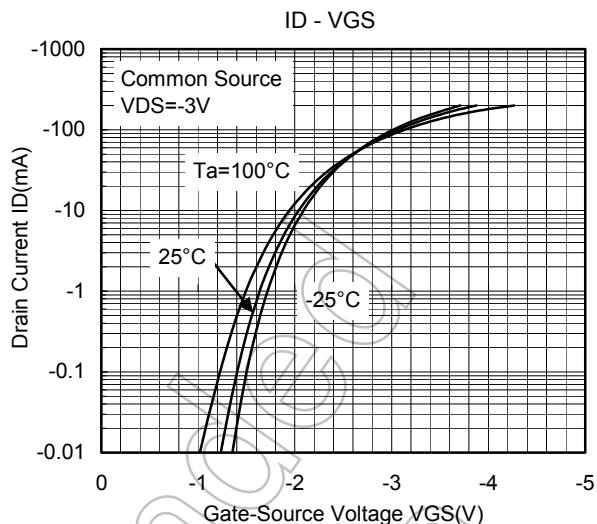
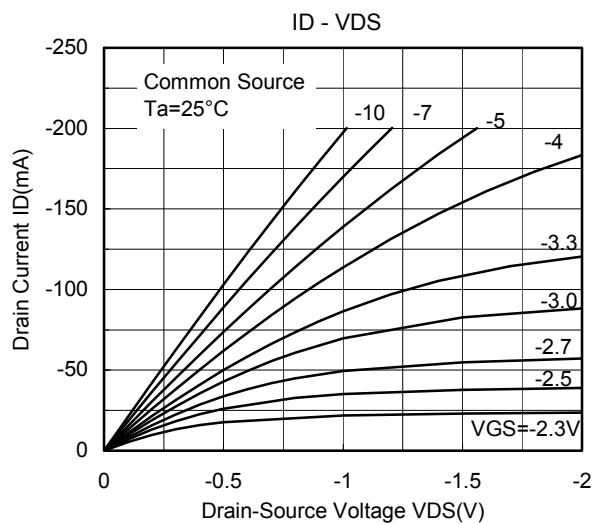
$V_{DS(\text{ON})}$

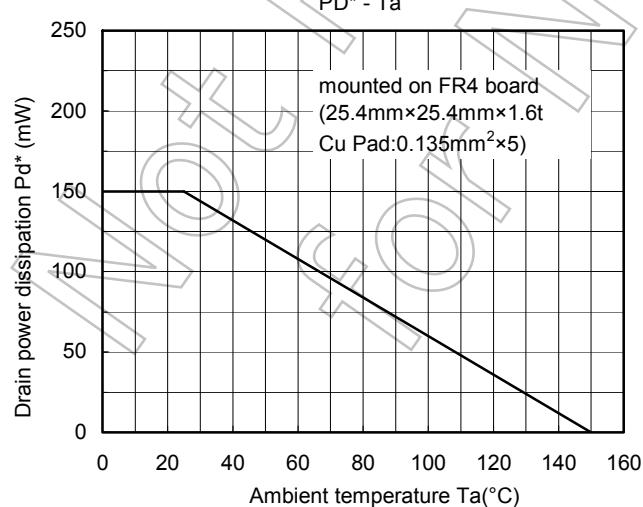
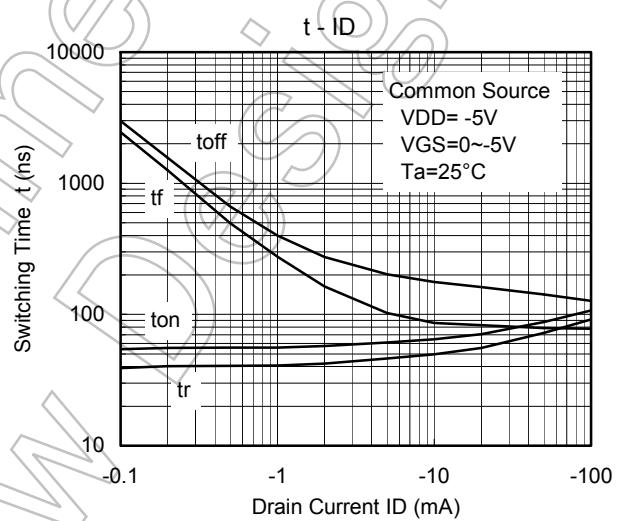
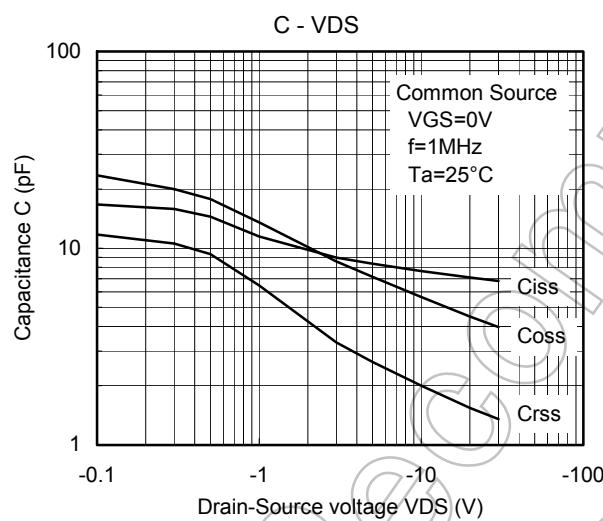
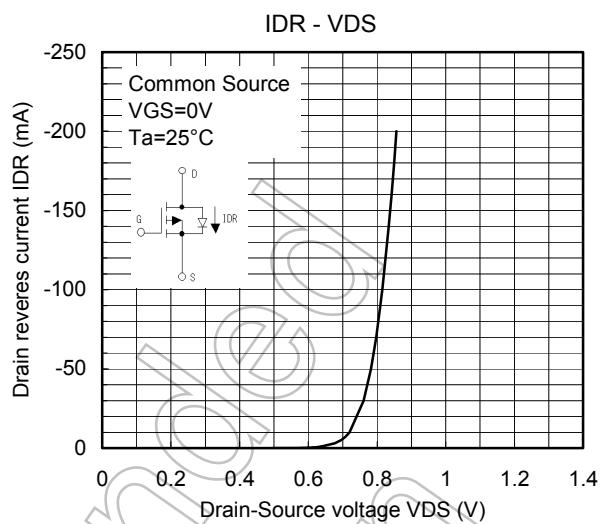
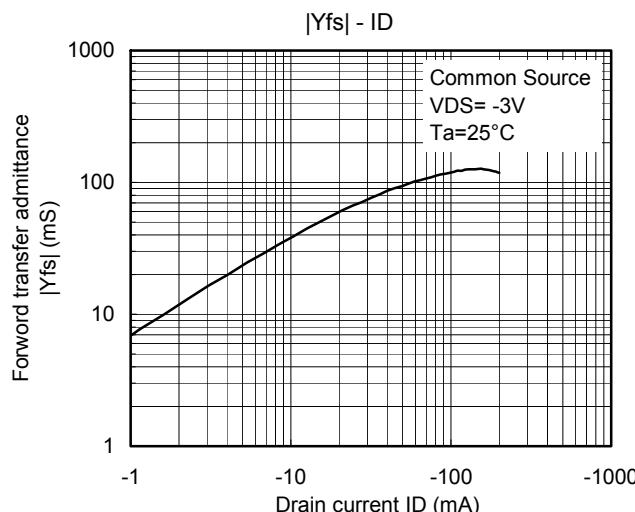


Precaution

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.





*: Total Rating

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