

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type

SSM5P15FU

High Speed Switching Applications

Analog Switch Applications

Unit: mm

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

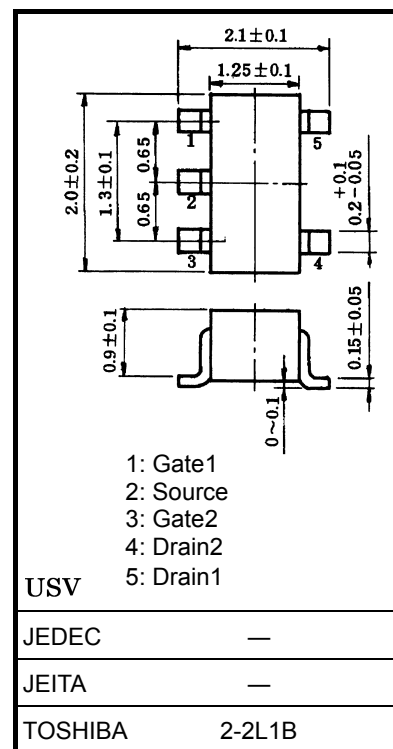
**Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)
(Q1, Q2 Common)**

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 ($T_a = 25^\circ\text{C}$)		P_D (Note 1)	200	mW
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

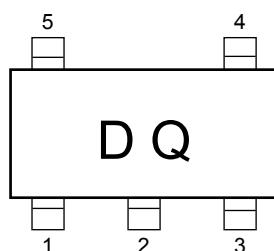
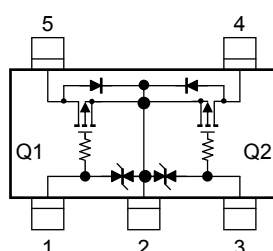
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

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.



Weight: 0.006g(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.

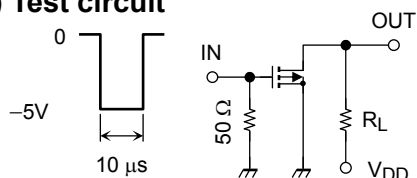
Start of commercial production
2002-03

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

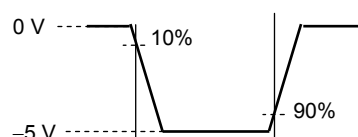
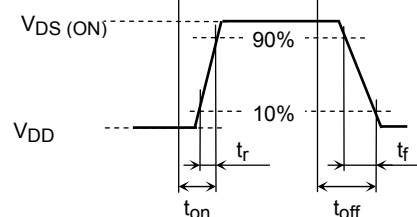
Characteristic		Symbol	Test Condition	MIN.	TYP.	MAX.	UNIT
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$	—	—	± 1	μA
Drain-Source breakdown voltage		$V_{(BR)DSS}$	$I_D = -0.1 \text{ mA}, V_{GS} = 0$	-30	—	—	V
Drain cut-off current		I_{DSS}	$V_{DS} = -30 \text{ V}, V_{GS} = 0$	—	—	-1	μA
Gate threshold voltage		V_{th}	$V_{DS} = -3 \text{ V}, I_D = -0.1 \text{ mA}$	-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		$R_{DS(ON)}$	$I_D = -10 \text{ mA}, V_{GS} = -4 \text{ V}$	—	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}	$V_{DD} = -5 \text{ V}, I_D = -10 \text{ mA},$ $V_{GS} = 0 \text{ to } -5 \text{ V}$	—	65	—	ns
	Turn-off time	t_{off}		—	175	—	

Switching Time Test Circuit

(a) Test circuit



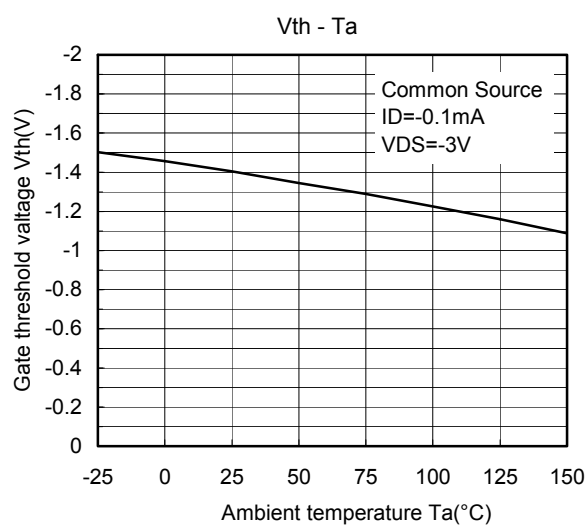
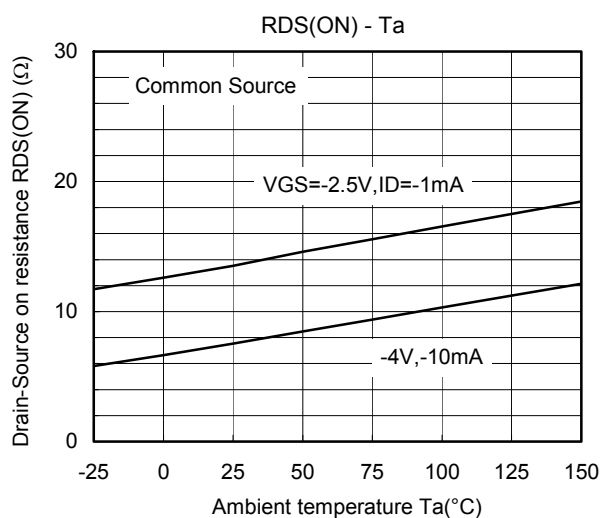
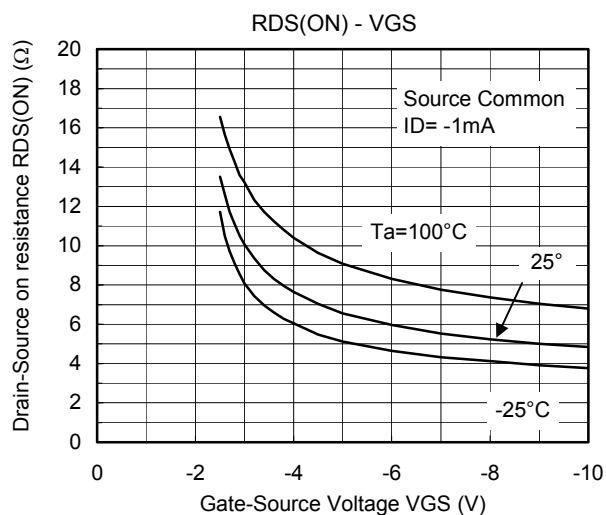
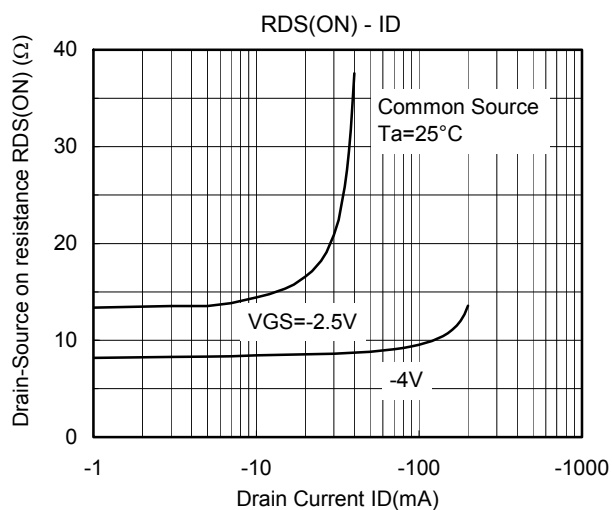
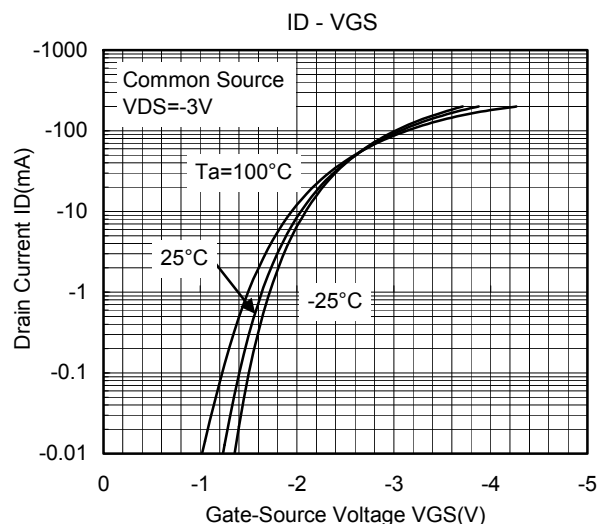
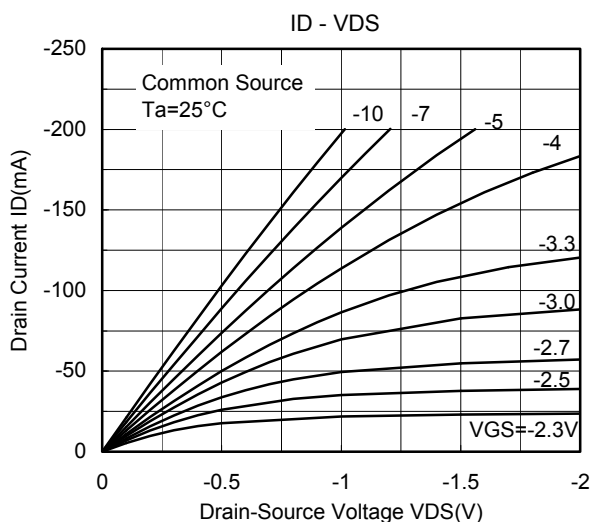
$V_{DD} = -5 \text{ V}$
 Duty $\leq 1\%$
 V_{IN} : $t_r, t_f < 5 \text{ ns}$
 $(Z_{out} = 50 \Omega)$
 Common Source
 $T_a = 25^\circ\text{C}$

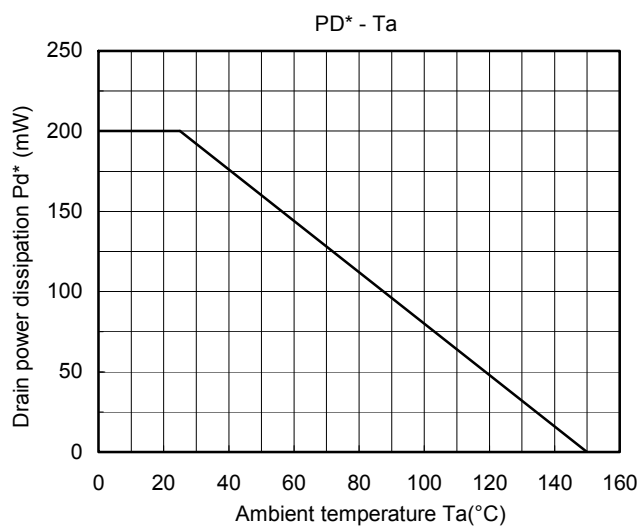
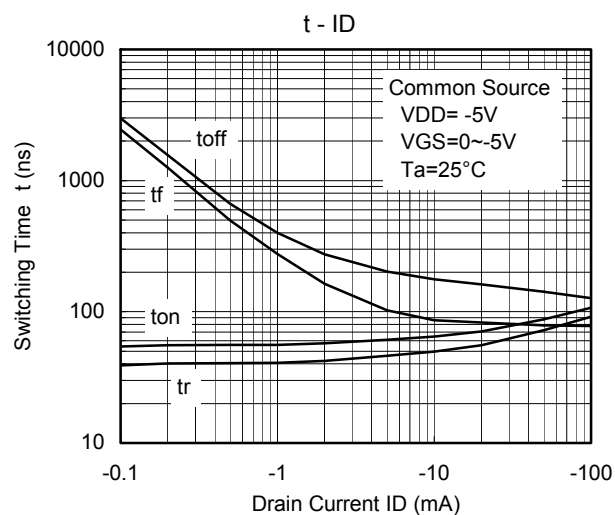
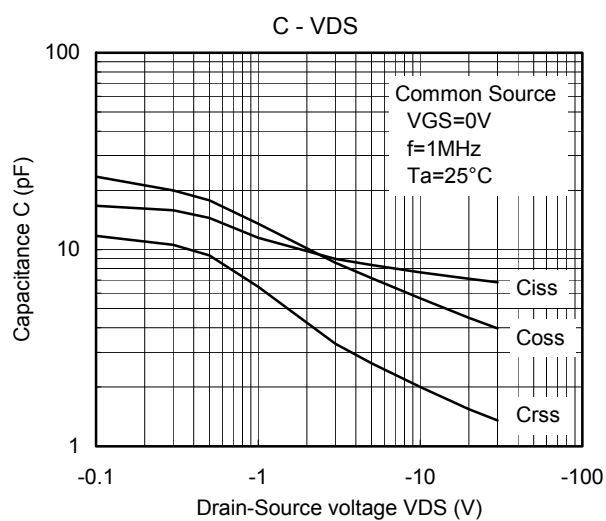
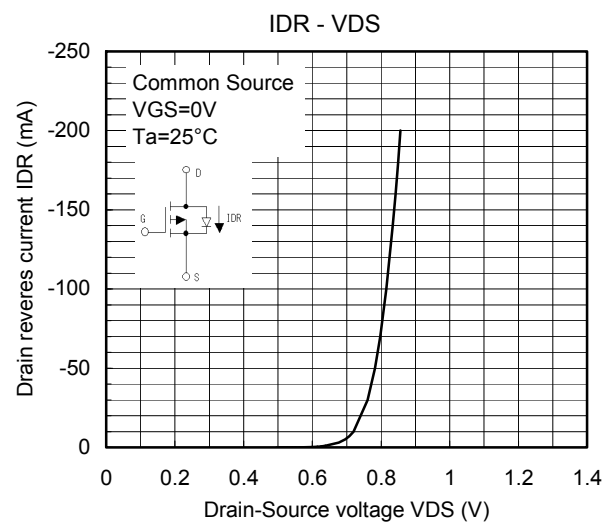
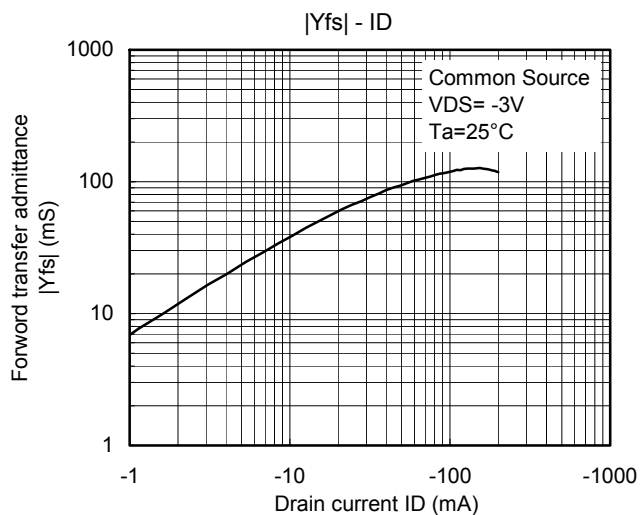
(b) V_{IN} (c) V_{OUT} 

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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