

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type(π-MOSVI)

SSM6P16FU

High Speed Switching Applications

Analog Switch Applications

- Small package
- Low on-resistance
 - : $R_{DS(ON)} = 8 \Omega$ (max) (@ $V_{GS} = -4$ V)
 - : $R_{DS(ON)} = 12 \Omega$ (max) (@ $V_{GS} = -2.5$ V)
 - : $R_{DS(ON)} = 45 \Omega$ (max) (@ $V_{GS} = -1.5$ V)

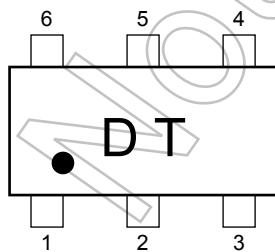
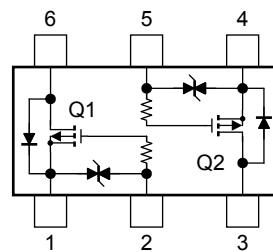
Absolute Maximum Ratings (Ta = 25°C)
(Q1, Q2 Common)

Characteristics	Symbol	Rating	Unit
Drain-Source voltage	V_{DS}	-20	V
Gate-Source voltage	V_{GSS}	± 10	V
Drain current	DC	I_D	mA
	Pulse	I_{DP}	
Power dissipation	P_D (Note1)	200	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.

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.).

Note1: Total rating

Marking**Equivalent Circuit (top view)****Handling Precaution**

When handling individual devices (which are not yet mounted on a circuit board), ensure that the environment is protected against static 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
2002-01

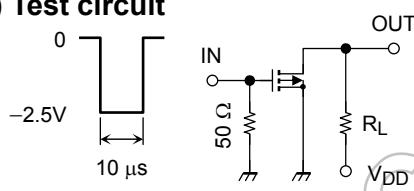
Electrical Characteristics ($T_a = 25^\circ\text{C}$) (Q1, Q2 common)

Characteristic	Symbol	Test Condition	MIN.	TYP.	MAX.	UNIT
Gate leakage current	I_{GSS}	$V_{GS} = \pm 10\text{ V}$, $V_{DS} = 0$	—	—	± 1	μA
Drain-Source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = -0.1\text{ mA}$, $V_{GS} = 0$	-20	—	—	V
Drain cut-off current	I_{DSS}	$V_{DS} = -20\text{ V}$, $V_{GS} = 0$	—	—	-1	μA
Gate threshold voltage	V_{th}	$V_{DS} = -3\text{ V}$, $I_D = -0.1\text{ mA}$	-0.6	—	-1.1	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = -3\text{ V}$, $I_D = -10\text{ mA}$ (Note2)	25	—	—	mS
Drain-Source on-resistance	$R_{DS(\text{ON})}$	$I_D = -10\text{ mA}$, $V_{GS} = -4\text{ V}$ (Note2)	—	6	8	Ω
		$I_D = -10\text{ mA}$, $V_{GS} = -2.5\text{ V}$ (Note2)	—	8	12	
		$I_D = -1\text{ mA}$, $V_{GS} = -1.5\text{ V}$ (Note2)	—	18	45	
Input capacitance	C_{iss}	$V_{DS} = -3\text{ V}$, $V_{GS} = 0$, $f = 1\text{ MHz}$	—	11	—	pF
Reverse transfer capacitance	C_{rss}		—	3.7	—	pF
Output capacitance	C_{oss}		—	10	—	pF
Switching time	Turn-on time	t_{on}	$V_{DD} = -3\text{ V}$, $I_D = -10\text{ mA}$, $V_{GS} = 0$ to -2.5 V	130	—	ns
	Turn-off time	t_{off}		190	—	

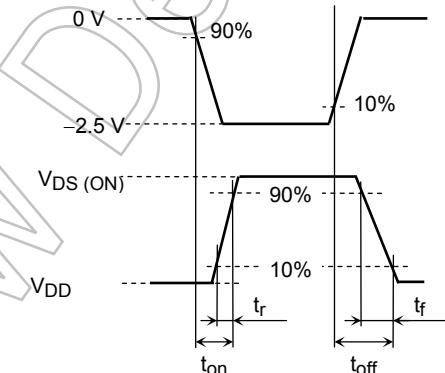
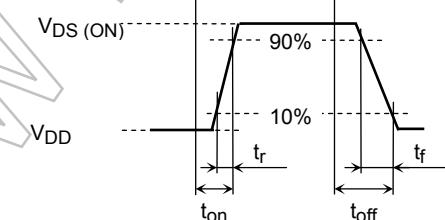
Note2: Pulse test

Switching Time Test Circuit

(a) Test circuit



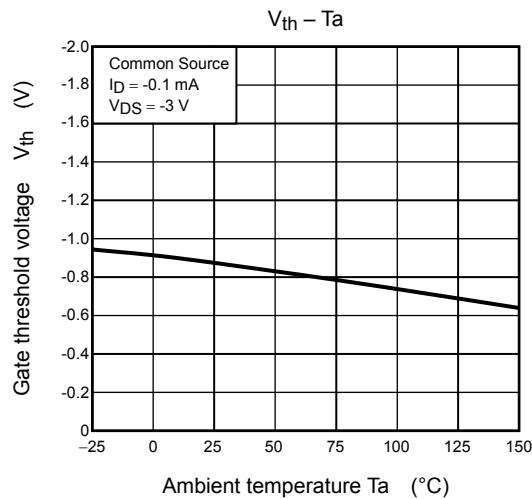
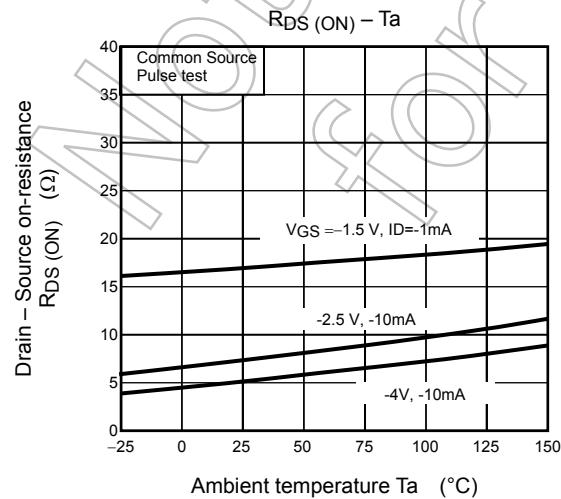
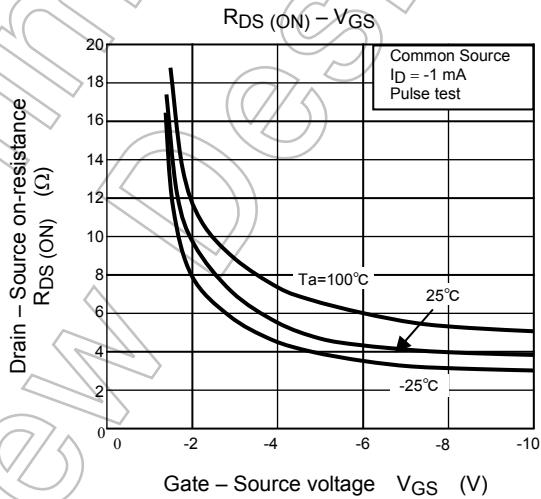
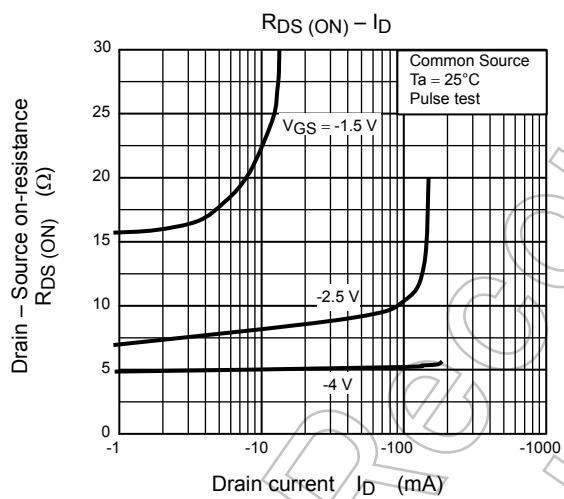
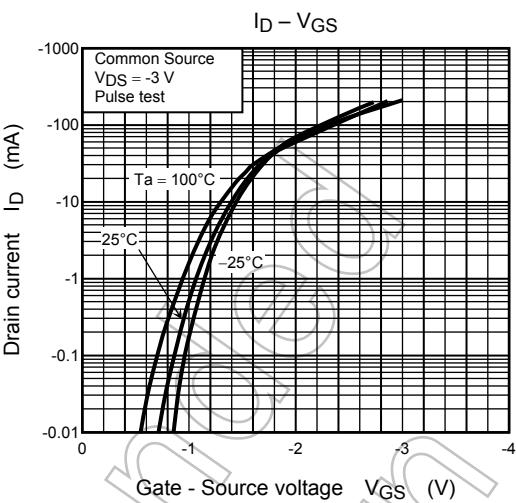
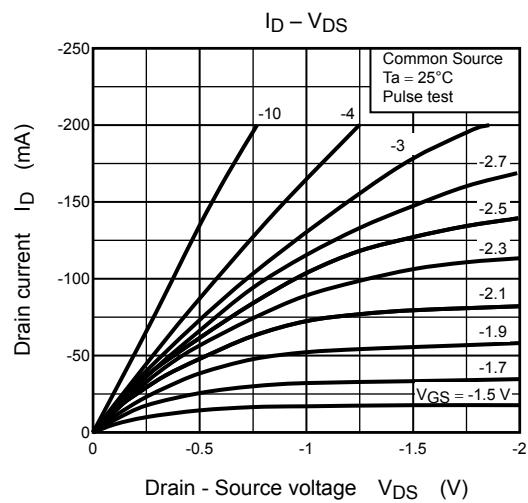
$V_{DD} = -3\text{ V}$
 Duty $\leq 1\%$
 V_{IN} : $t_r, t_f < 5\text{ ns}$
 $(Z_{out} = 50\ \Omega)$
 Common Source
 $T_a = 25^\circ\text{C}$

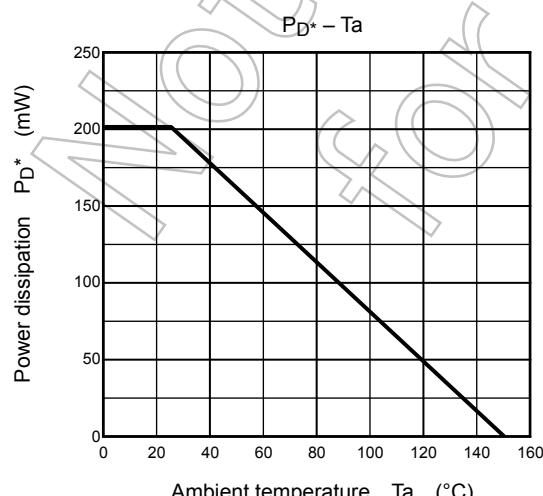
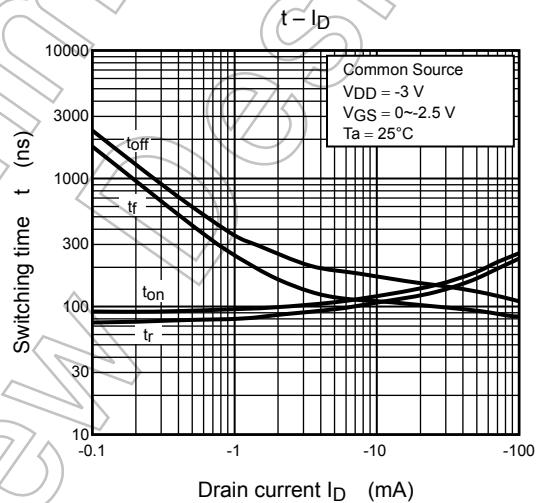
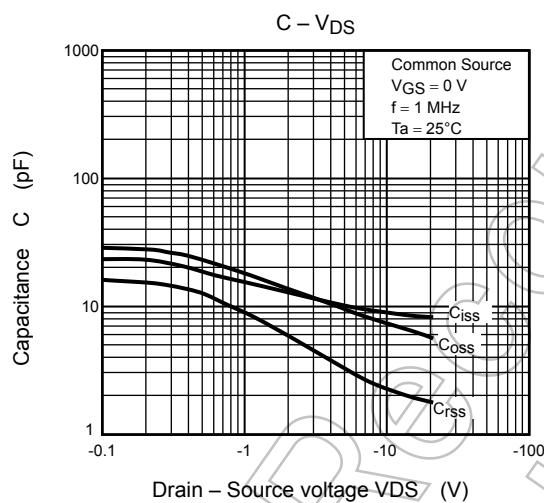
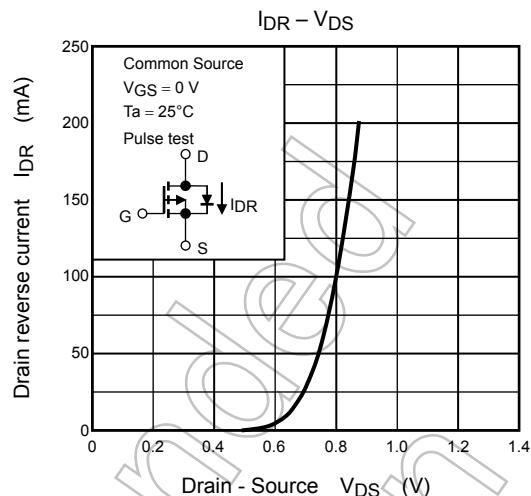
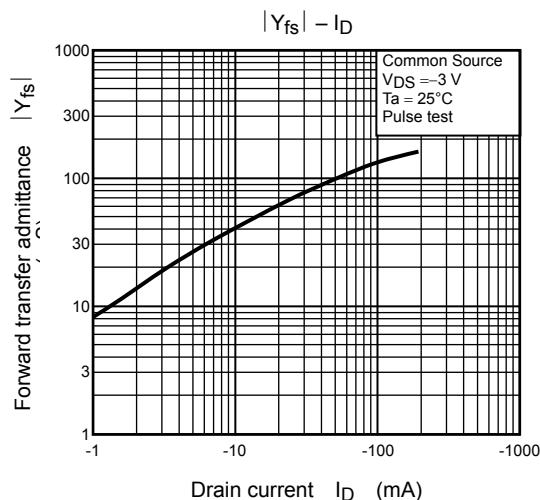
(b) V_{IN} (c) V_{OUT} 

Precaution

V_{th} can be expressed as the voltage between the gate and source when the low operating current value is $I_D = -0.1\text{ mA}$ for this product. For normal switching operation, V_{GS} (on) requires a higher voltage than V_{th} and V_{GS} (off) requires a lower voltage than V_{th} . (The relationship can be established as follows: V_{GS} (off) $< V_{th} < V_{GS}$ (on).)

Be sure to take this into consideration when using the device.





*:Total rating

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