TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE

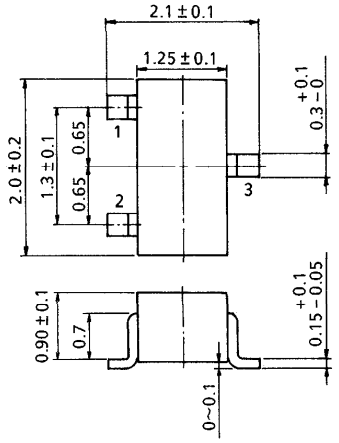
SSM3J05FU

POWER MANAGEMENT SWITCH

HIGH SPEED SWITCHING APPLICATIONS

- Small Package
- Low on Resistance : R_{on} = 3.3 Ω Max. (@V_{GS} = −4 V)
  : R_{on} = 4.0 Ω Max. (@V_{GS} = −2.5 V)
- Low Gate Threshold Voltage

Unit in mm



1 : GATE
2 : SOURCE
3 : DRAIN

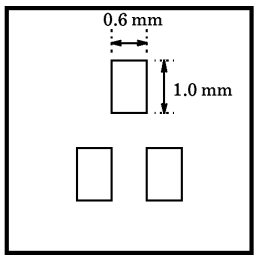
USM	
JEDEC	—
EIAJ	SC-70
TOSHIBA	2-2E1E

Weight : 0.006 g (Typ.)

MAXIMUM RATINGS (Ta = 25°C)

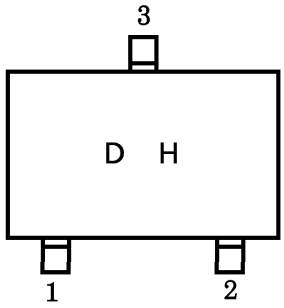
CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DS}	−20	V
Gate-Source Voltage		V_{GSS}	±12	V
Drain Current	DC	I_D	−200	mA
	Pulse	I_{DP}	−400	
Drain Power Dissipation (Ta = 25°C)		P_D*	150	mW
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

* Mounted on FR4 board.
(25.4 mm × 25.4 mm × 1.6 t, Cu Pad : 0.6 mm^2 × 3)

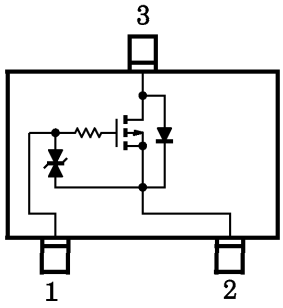


000707EAA1

MARKING



EQUIVALENT CIRCUIT (TOP VIEW)



HANDLING PRECAUTION

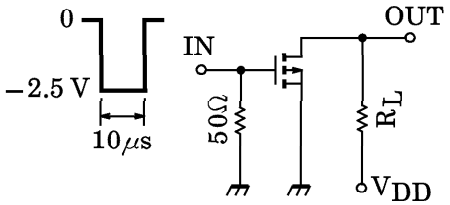
When handling individual devices (which are not yet mounting on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static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

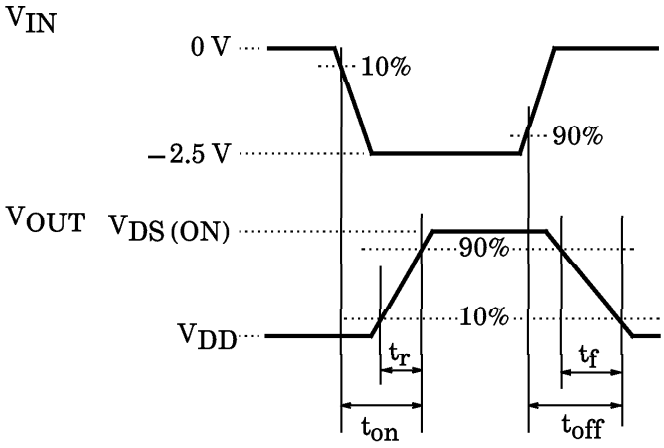
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 12$ V, $V_{DS} = 0$	—	—	±1	μA
Drain-Source Breakdown Voltage		$V_{(BR)\,DSS}$	$I_D = -1$ mA, $V_{GS} = 0$	−20	—	—	V
Drain Cut-off Current		I_{DSS}	$V_{DS} = -20$ V, $V_{GS} = 0$	—	—	−1	μA
Gate Threshold Voltage		V_{th}	$V_{DS} = -3$ V, $I_D = -0.1$ mA	−0.6	—	−1.1	V
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS} = -3$ V, $I_D = -50$ mA (Note)	100	—	—	mS
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$I_D = -100$ mA, $V_{GS} = -4$ V (Note)	—	2.1	3.3	Ω
			$I_D = -50$ mA, $V_{GS} = -2.5$ V (Note)	—	3.2	4.0	
Input Capacitance		C_{iss}	$V_{DS} = -3$ V, $V_{GS} = 0$, f = 1 MHz	—	27	—	pF
Reverse Transfer Capacitance		C_{rss}	$V_{DS} = -3$ V, $V_{GS} = 0$, f = 1 MHz	—	7	—	pF
Output Capacitance		C_{oss}	$V_{DS} = -3$ V, $V_{GS} = 0$, f = 1 MHz	—	21	—	pF
Switching Time	Turn-on Time	t_{on}	$V_{DD} = -3$ V, $I_D = -50$ mA, $V_{GS} = 0 \sim -2.5$ V	—	70	—	ns
	Turn-off Time	t_{off}		—	70	—	

(Note) : Pulse test

SWITCHING TIME TEST CIRCUIT



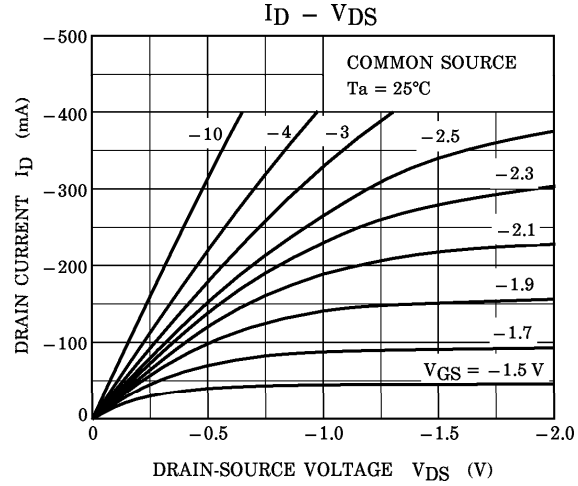


V_{DD} = −3 V
D.U. ≦ 1%
V_{IN} : t_r, t_f < 5 ns
(Z_{OUT} = 50 Ω)
COMMON SOURCE
Ta = 25°C

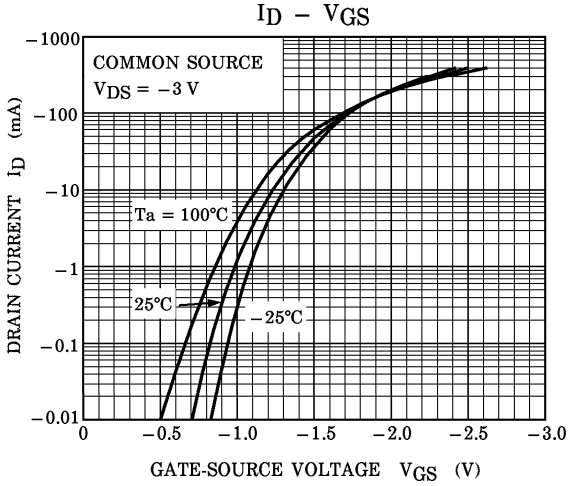
PRECAUTION

V_{th} can be expressed as voltage between gate and source when low operating current value is I_D = −100 μA 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.

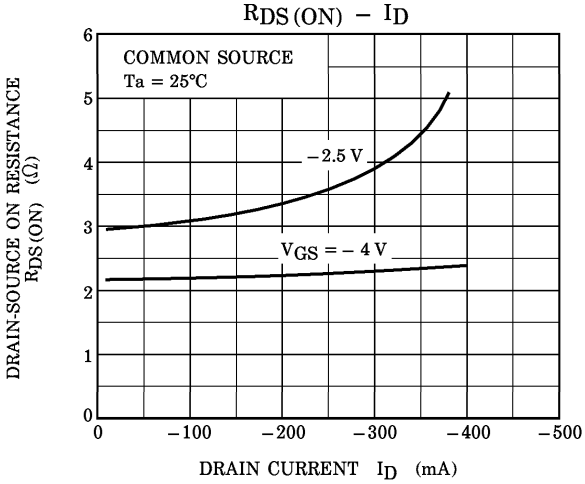
$I_D - V_{DS}$



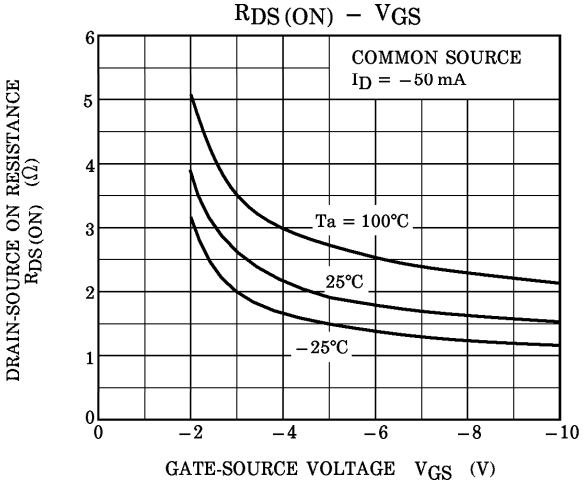
$I_D - V_{GS}$



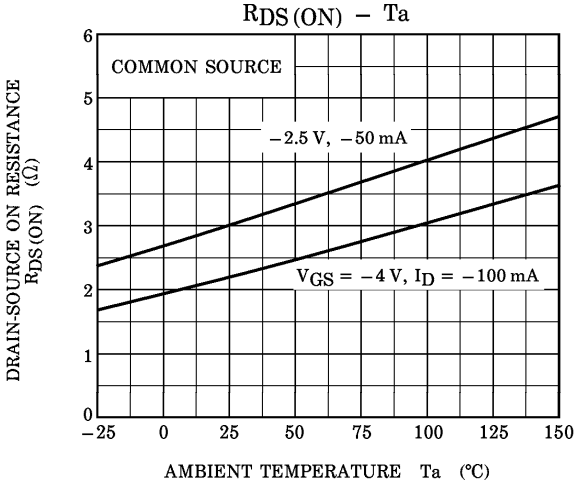
$R_{DS\,(ON)} - I_D$



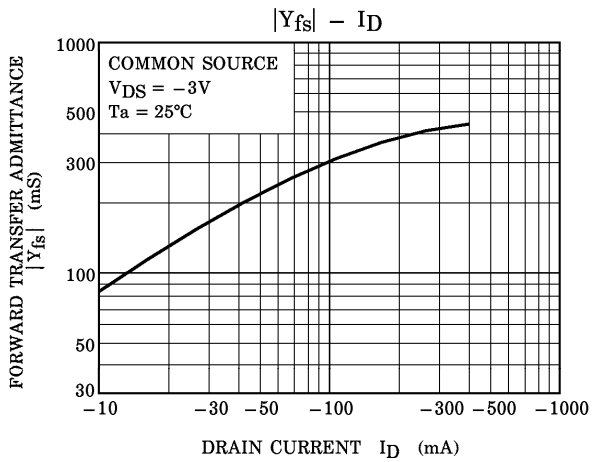
$R_{DS\,(ON)} - V_{GS}$



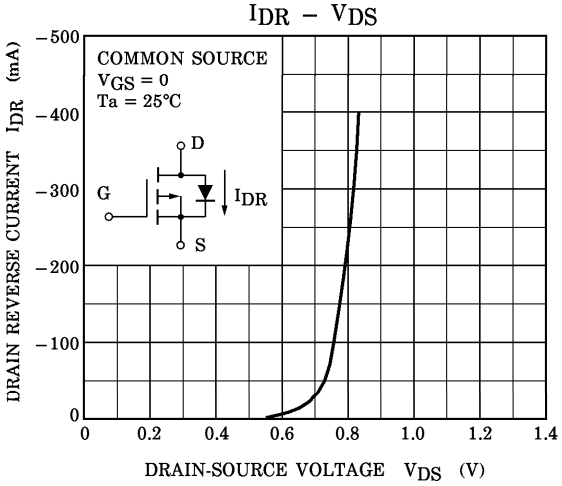
$R_{DS\,(ON)} - Ta$



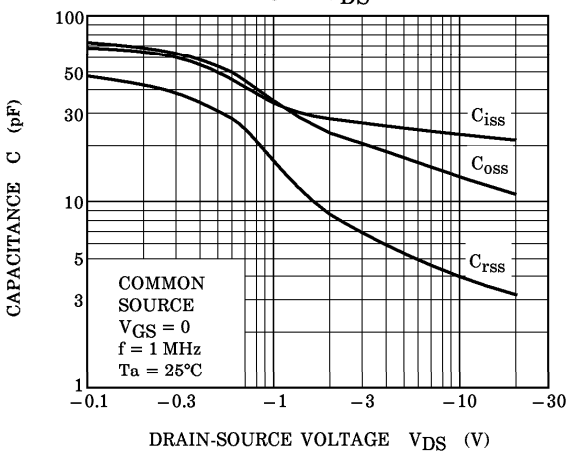
$|Y_{fs}| - I_D$



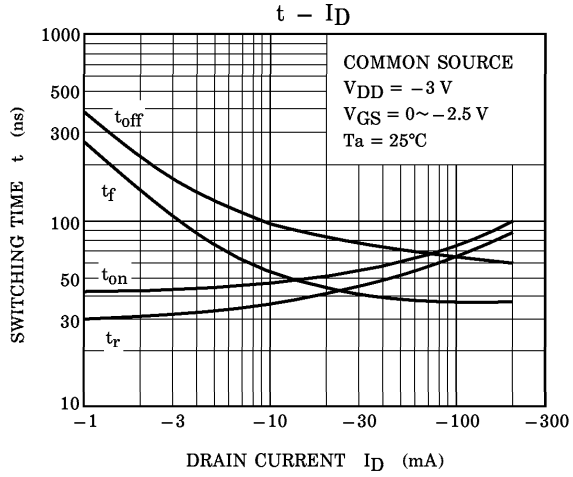
I_{DR} – V_{DS}



C – V_{DS}



t – I_D



P_D – Ta