

$V_{DSS}$	-12V
$R_{DS(on)(Max.)}$	26mΩ
$I_D$	±5A
$P_D$	1.25W

### ●Features

- 1) Low on - resistance.
- 2) High power package
- 3) Low voltage drive(1.5V)

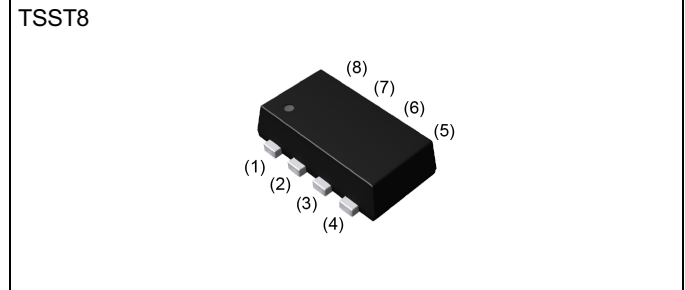
### ●Application

Switching

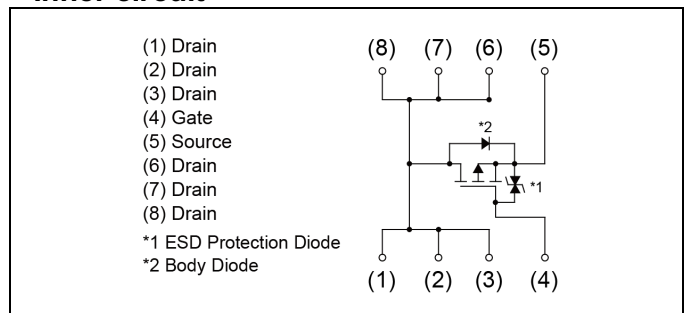
### ●Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Value	Unit
Drain - Source voltage	$V_{DSS}$	-12	V
Continuous drain current	$I_D$	±5	A
Pulsed drain current	$I_{D,pulse}^{*1}$	±20	A
Gate - Source voltage	$V_{GSS}$	±10	V
Power dissipation	$P_D^{*2}$	1.25	W
	$P_D^{*3}$	0.6	W
Junction temperature	$T_j$	150	°C
Range of storage temperature	$T_{stg}$	-55 to +150	°C

### ●Outline



### ●Inner circuit



### ●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	180
	Tape width (mm)	8
	Basic ordering unit (pcs)	3000
	Taping code	TR
	Marking	YH

### ● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	$R_{thJA}^{*2}$	-	-	100	°C/W
	$R_{thJA}^{*3}$	-	-	208	°C/W

### ● Electrical characteristics ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -1mA$	-12	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	$I_D = -1mA$ referenced to $25^\circ\text{C}$	-	-21.9	-	mV/°C
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -12V, V_{GS} = 0V$	-	-	-1	$\mu\text{A}$
Gate - Source leakage current	$I_{GSS}$	$V_{GS} = \pm 10V, V_{DS} = 0V$	-	-	$\pm 10$	$\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = -6V, I_D = -1mA$	-0.3	-	-1.0	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	$I_D = -1mA$ referenced to $25^\circ\text{C}$	-	2.4	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*4}$	$V_{GS} = -4.5V, I_D = -5A$	-	19	26	m $\Omega$
		$V_{GS} = -2.5V, I_D = -2.5A$	-	26	36	
		$V_{GS} = -1.8V, I_D = -2.5A$	-	34	50	
		$V_{GS} = -1.5V, I_D = -1A$	-	48	96	
Forward Transfer Admittance	$ Y_{fs} ^{*4}$	$V_{DS} = -6V, I_D = -5A$	7	-	-	S

\*1  $P_w \leq 10\mu\text{s}$ , Duty cycle  $\leq 1\%$

\*2 Mounted on a ceramic board (30x30x0.8mm)

\*3 Mounted on a FR4 (20x20x0.8mm)

\*4 Pulsed

**●Electrical characteristics (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0V	-	2800	-	pF
Output capacitance	C <sub>oss</sub>	V <sub>DS</sub> = -6V	-	340	-	
Reverse transfer capacitance	C <sub>rss</sub>	f = 1MHz	-	310	-	
Turn - on delay time	t <sub>d(on)</sub> <sup>*4</sup>	V <sub>DD</sub> ≈ -6V, V <sub>GS</sub> = -4.5V	-	12	-	ns
Rise time	t <sub>r</sub> <sup>*4</sup>	I <sub>D</sub> = -2.5A	-	95	-	
Turn - off delay time	t <sub>d(off)</sub> <sup>*4</sup>	R <sub>L</sub> ≈ 2.4Ω	-	410	-	
Fall time	t <sub>f</sub> <sup>*4</sup>	R <sub>G</sub> = 10Ω	-	220	-	

**●Gate charge characteristics (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q <sub>g</sub> <sup>*4</sup>	V <sub>DD</sub> ≈ -6V,	-	34	-	nC
Gate - Source charge	Q <sub>gs</sub> <sup>*4</sup>	I <sub>D</sub> = -5A,	-	6.0	-	
Gate - Drain charge	Q <sub>gd</sub> <sup>*4</sup>	V <sub>GS</sub> = -4.5V	-	5.0	-	

**●Body diode electrical characteristics (Source-Drain) (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	I <sub>S</sub>	T <sub>a</sub> = 25°C	-	-	-1	A
Body diode pulse current	I <sub>SP</sub> <sup>*1</sup>		-	-	-20	A
Forward voltage	V <sub>SD</sub> <sup>*4</sup>	V <sub>GS</sub> = 0V, I <sub>S</sub> = -5A	-	-	-1.2	V

● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

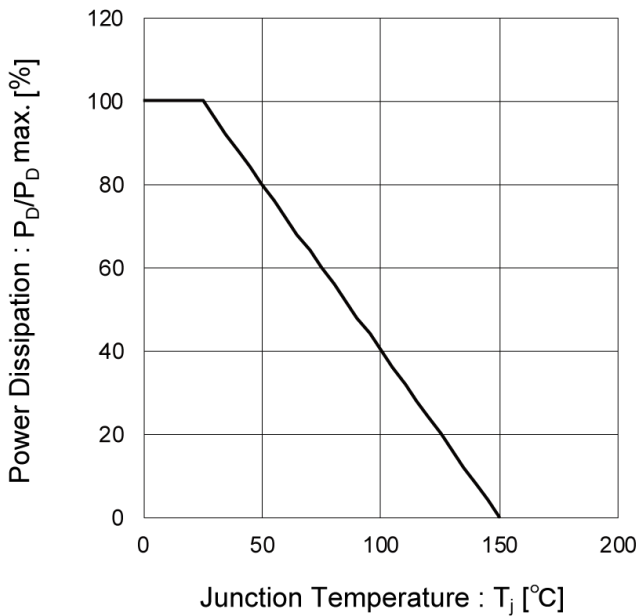


Fig.2 Maximum Safe Operating Area

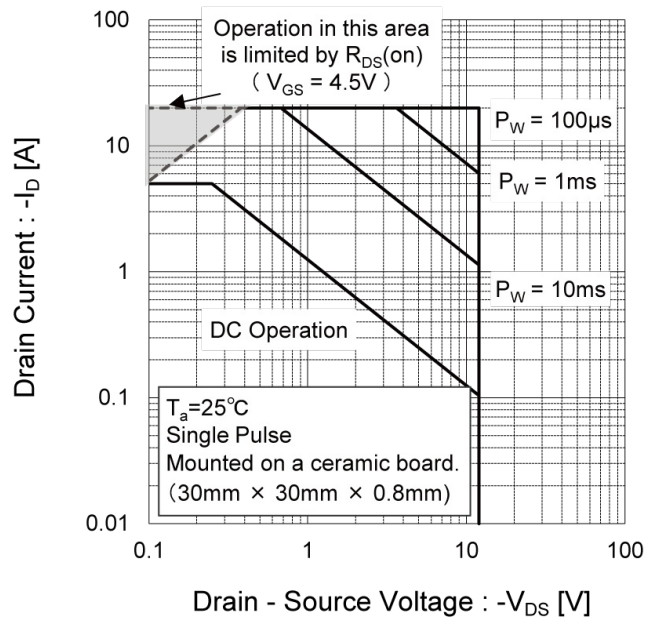


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

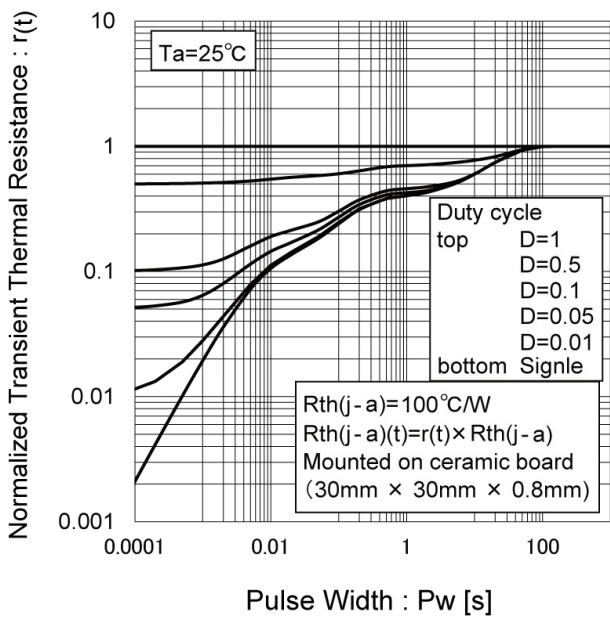
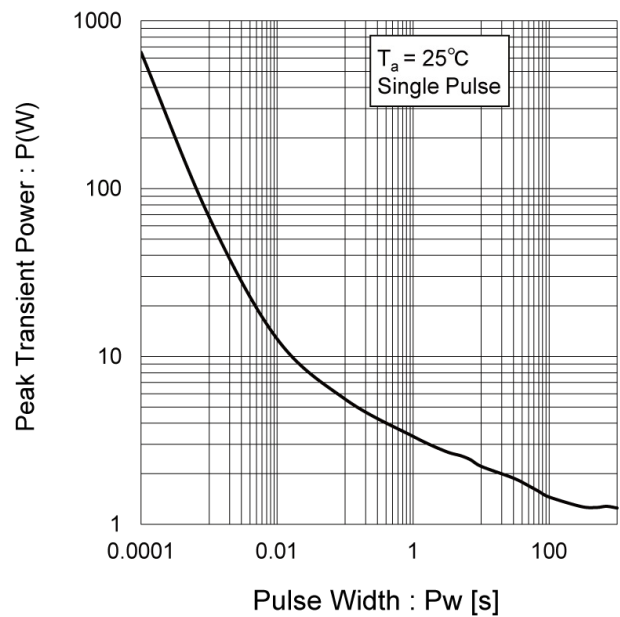


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

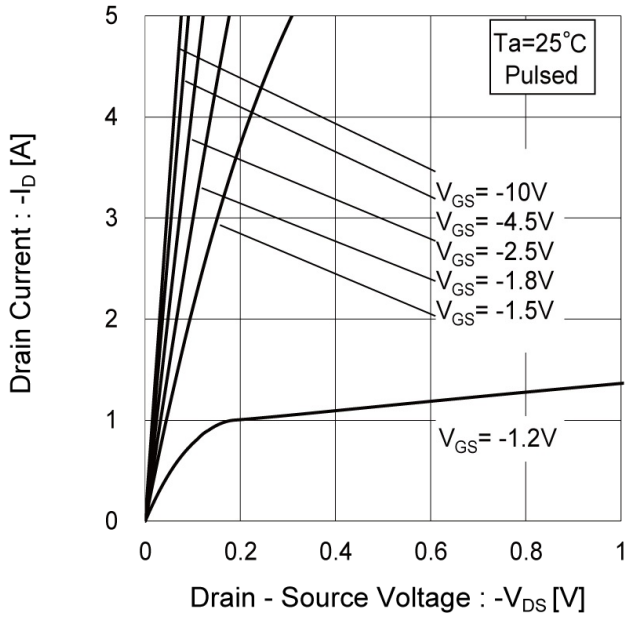


Fig.6 Typical Output Characteristics(II)

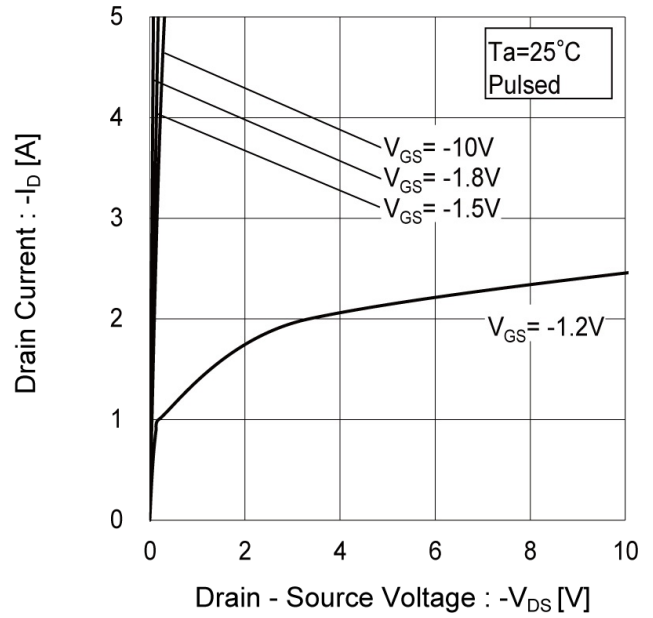


Fig.7 Breakdown Voltage vs. Junction Temperature

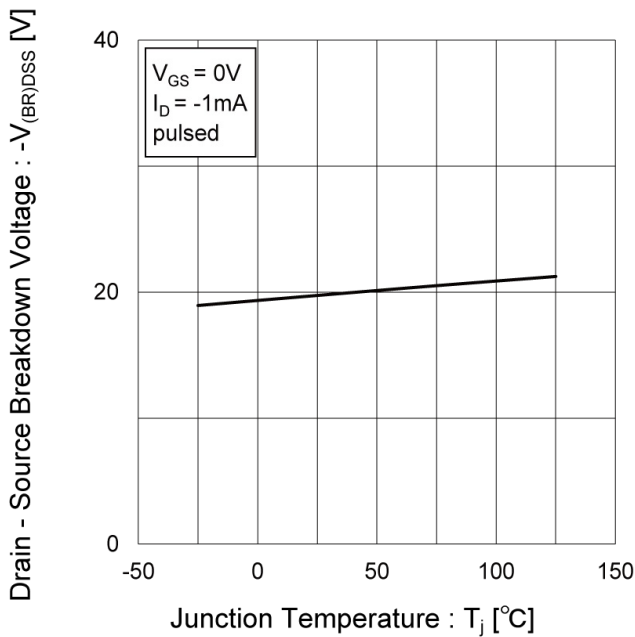
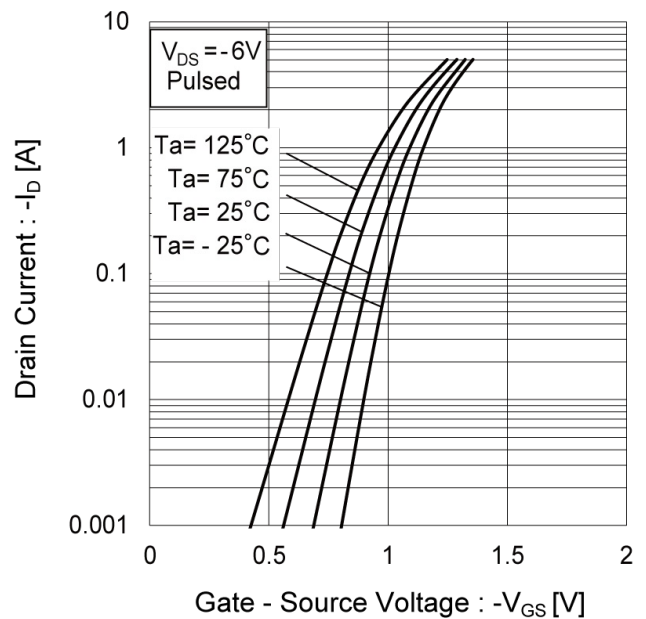


Fig.8 Typical Transfer Characteristics



● Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

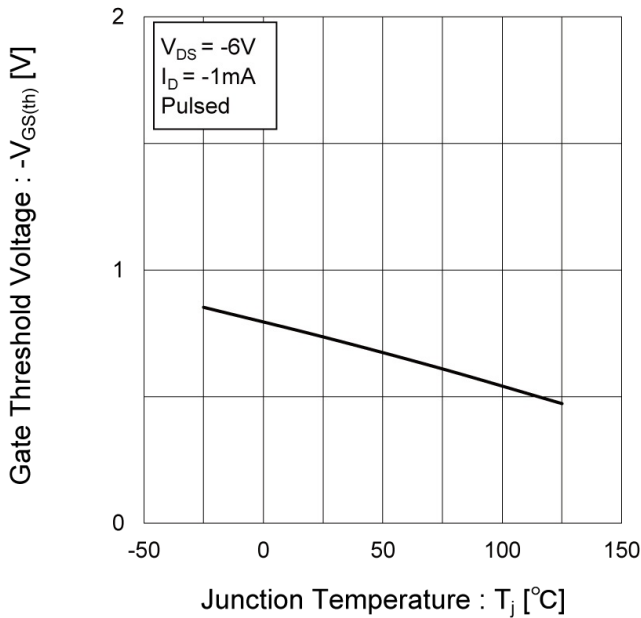


Fig.10 Forward Transfer Admittance vs. Drain Current

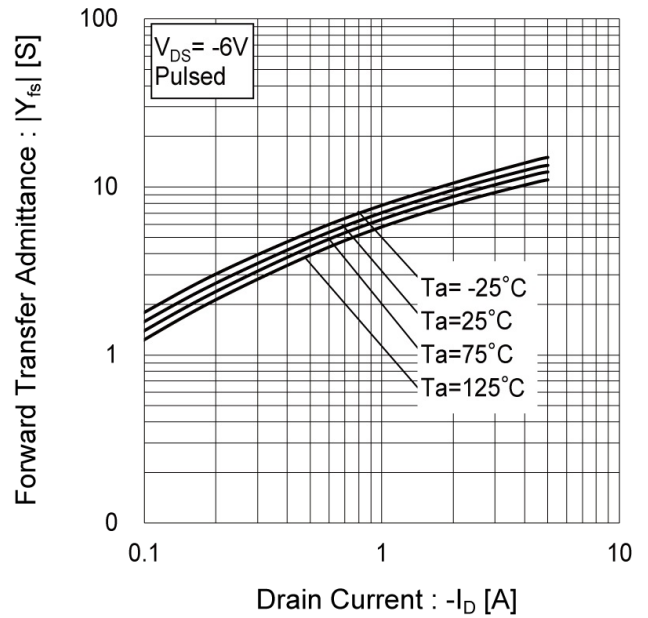


Fig.11 Drain Current Derating Curve

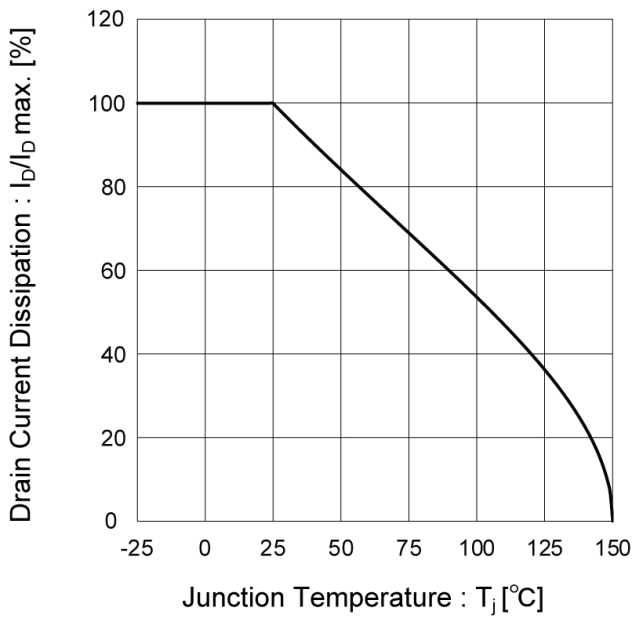
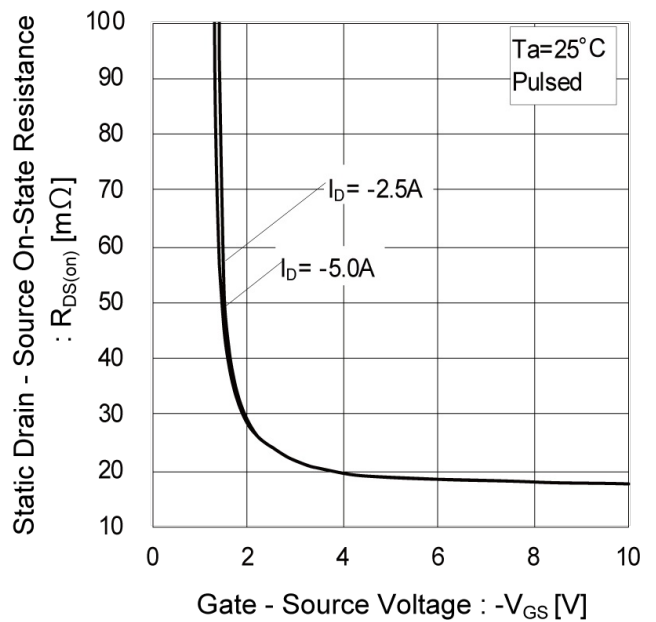


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



● Electrical characteristic curves

Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature

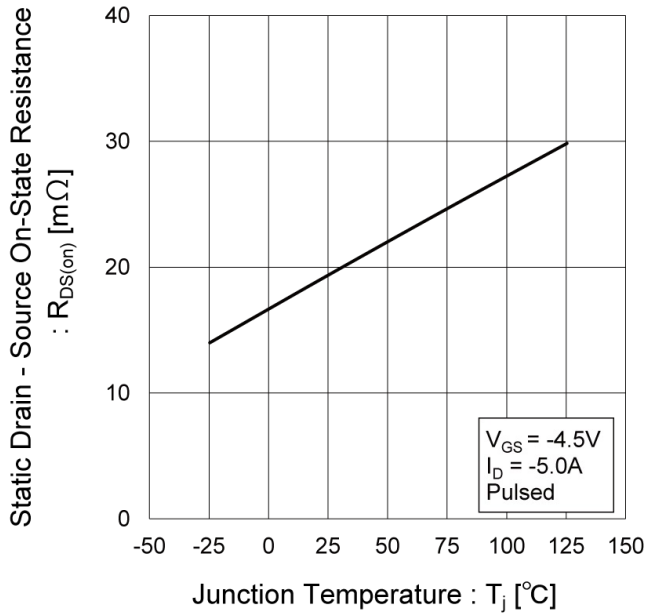
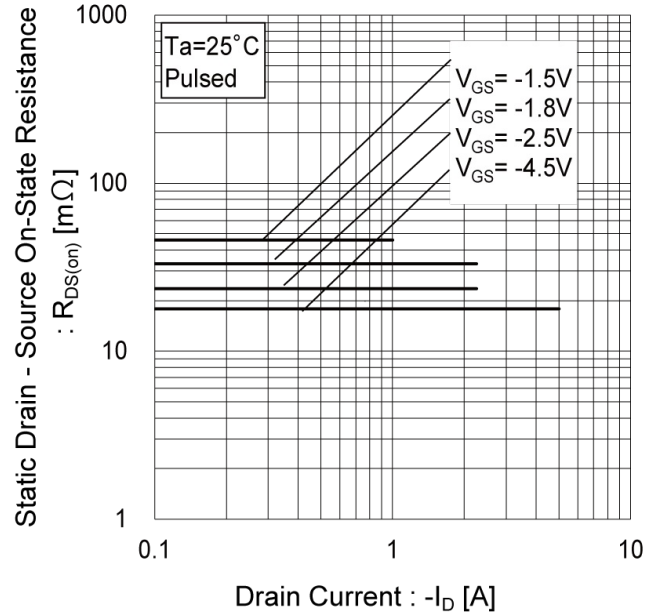


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)



● Electrical characteristic curves

Fig.15 Static Drain - Source On - State Resistance vs. Drain Current (II)

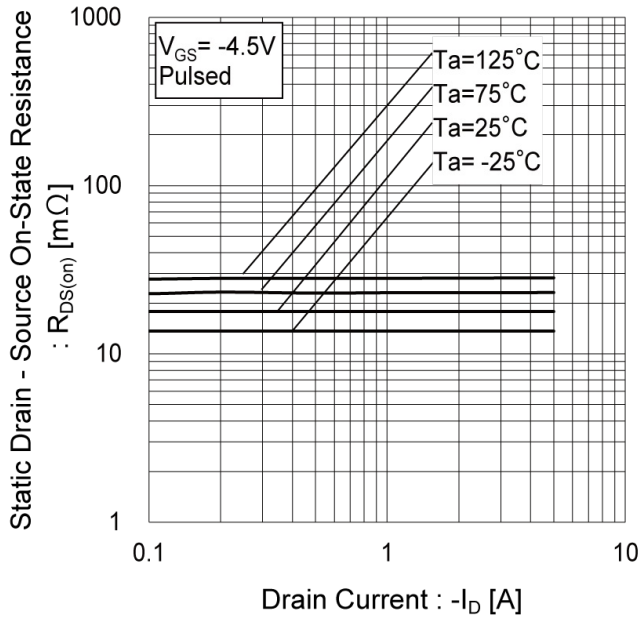


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current (III)

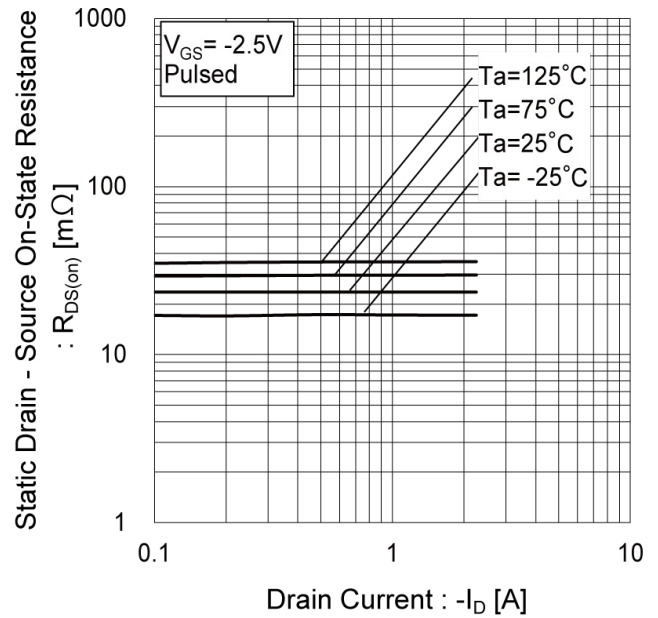


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current (IV)

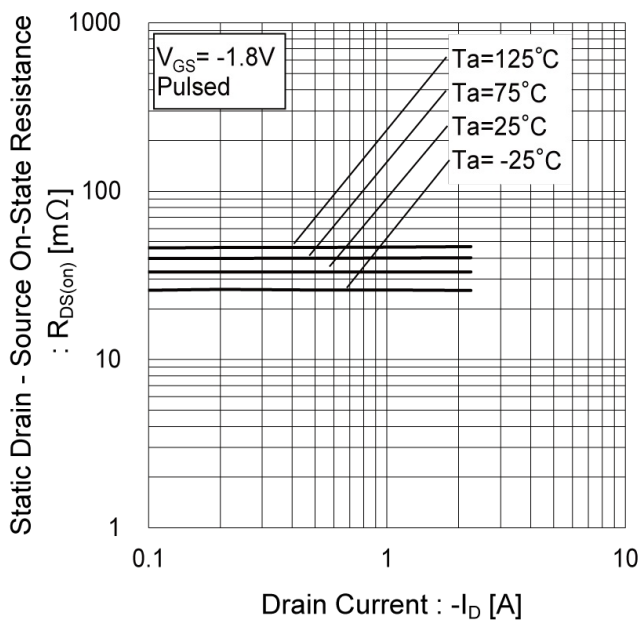
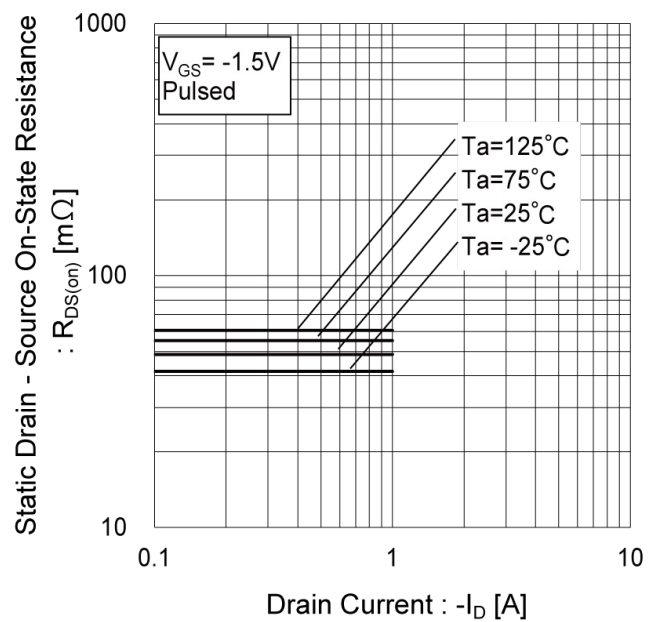


Fig.18 Static Drain - Source On - State Resistance vs. Drain Current (V)





● Electrical characteristic curves

Fig.19 Typical Capacitance vs. Drain - Source Voltage

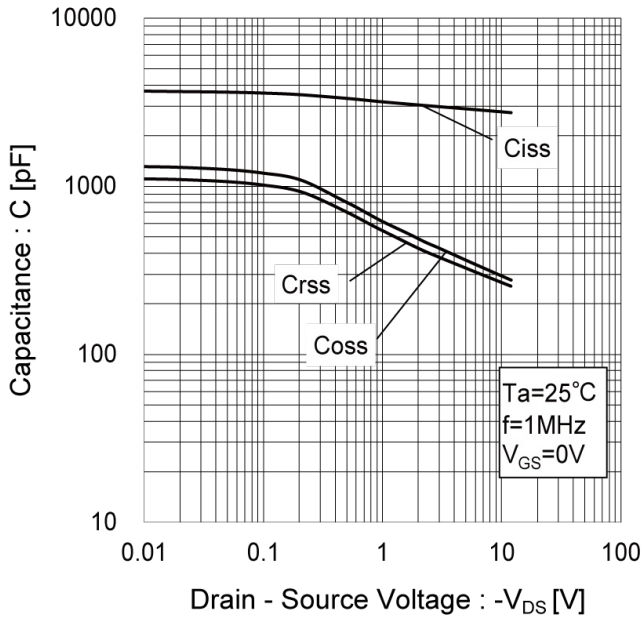


Fig.20 Switching Characteristics

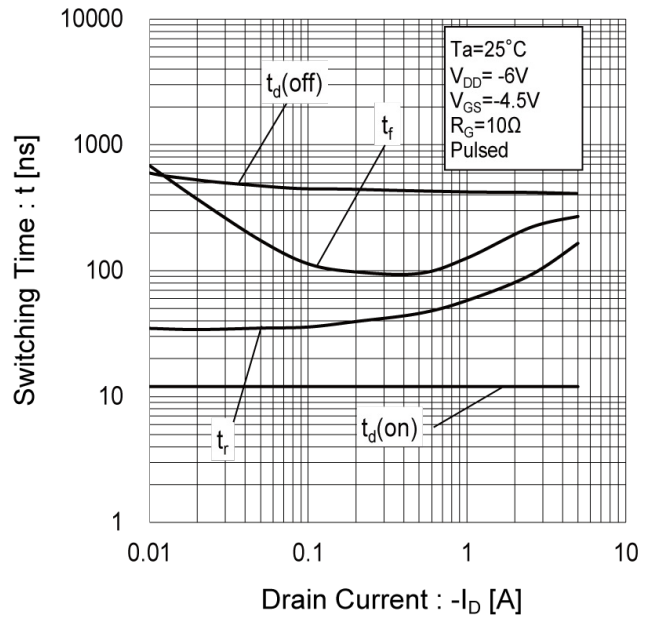


Fig.21 Dynamic Input Characteristics

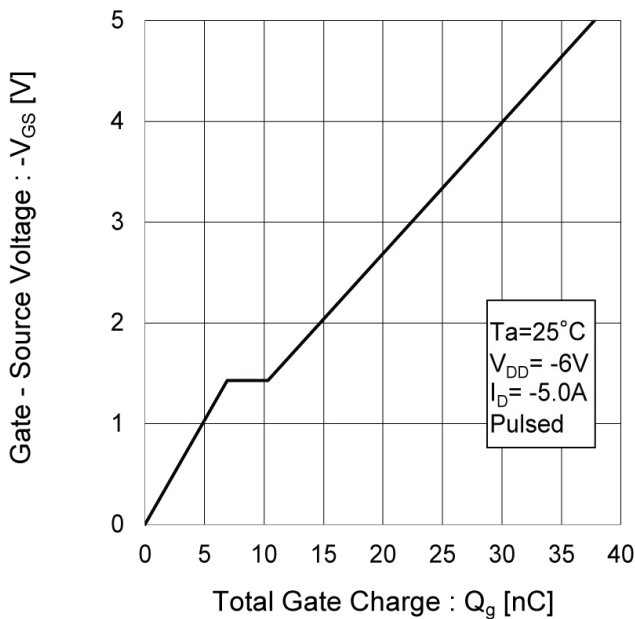
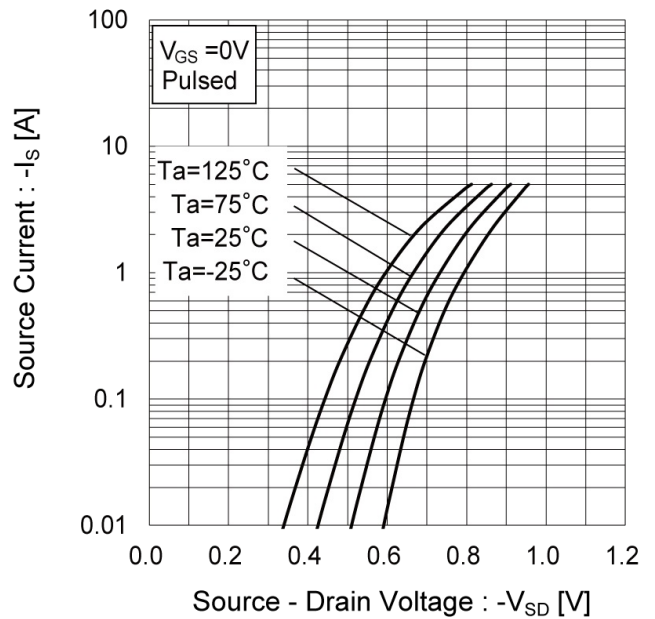


Fig.22 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig. 1-1 SWITCHING TIME MEASUREMENT CIRCUIT



Fig. 1-2 SWITCHING WAVEFORMS

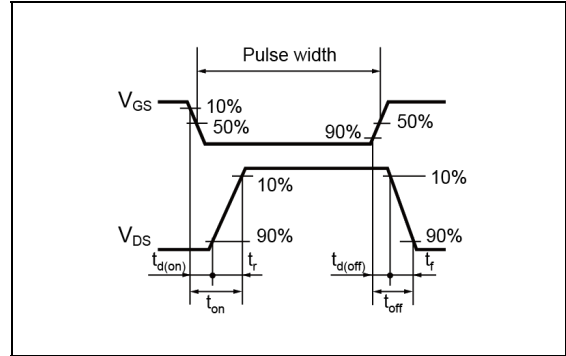


Fig. 2-1 GATE CHARGE MEASUREMENT CIRCUIT



Fig. 2-2 GATE CHARGE WAVEFORM

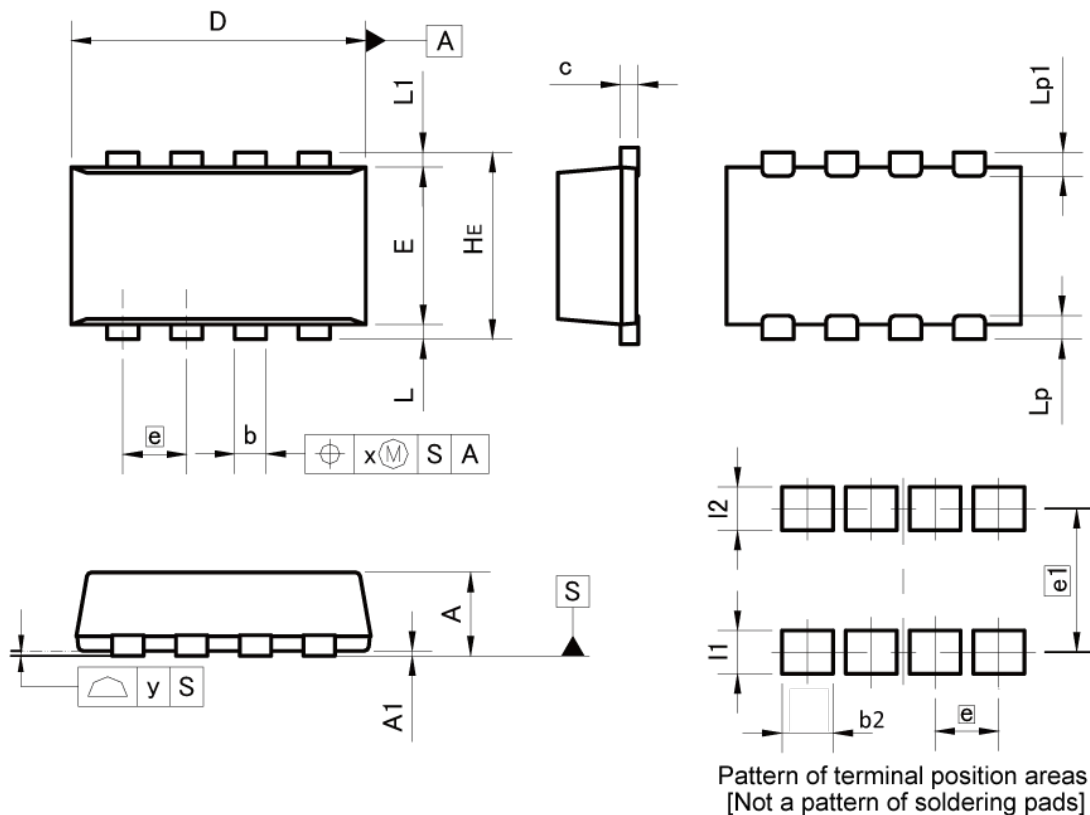


● Notice

This product might cause chip aging and breakdown under the large electrified environment. Please consider to design ESD protection circuit.

●Dimensions

TSST8



Pattern of terminal position areas  
[Not a pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.75	0.85	0.030	0.033
A1	0.00	0.05	0.000	0.002
b	0.22	0.42	0.009	0.017
c	0.12	0.22	0.005	0.009
D	2.90	3.10	0.114	0.122
E	1.50	1.70	0.059	0.067
e	0.65		0.026	
HE	1.80	2.00	0.071	0.079
L	0.05	0.25	0.002	0.010
L1	0.05	0.25	0.002	0.010
Lp	0.15	0.34	0.006	0.013
Lp1	0.15	0.34	0.006	0.013
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.52	-	0.020
e1	1.46		0.057	
I1	-	0.44	-	0.017
I2	-	0.44	-	0.017

Dimension in mm/inches

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