

V_{DSS}	-30V
$R_{DS(on)(Max.)}$	84mΩ
I_D	±2.5A
P_D	1.25W

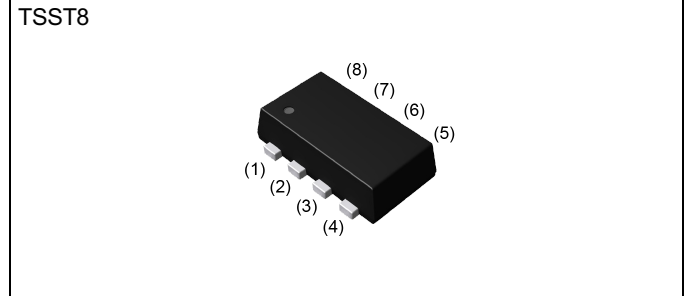
●Features

- 1) Low on - resistance.
- 2) Small Surface Mount Package .
- 3) Pb-free lead plating ; RoHS compliant.
- 4) Halogen Free.

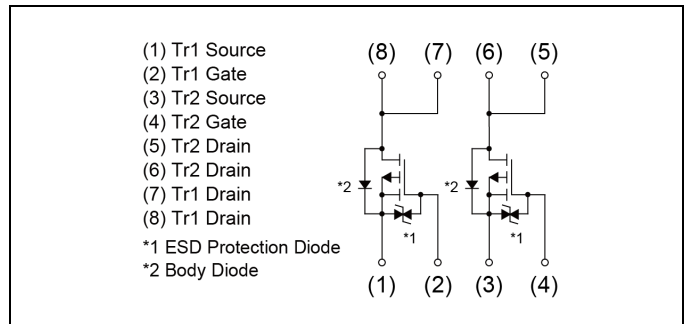
●Application

Switching

●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	J03	

●Absolute maximum ratings ($T_a = 25^\circ\text{C}$) <It is the same ratings for the Tr1 and Tr2>

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	-30	V
Continuous drain current	I_D	±2.5	A
Pulsed drain current	$I_{D,pulse}^{*1}$	±6	A
Gate - Source voltage	V_{GSS}	±20	V
Power dissipation	total	1.25	W
	element	1.0	
Junction temperature	T_j	150	°C
Range of storage temperature	T_{stg}	-55 to +150	°C

● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	total	-	100	-	
	element	-	125	-	

● Electrical characteristics ($T_a = 25^\circ\text{C}$) <It is the same characteristics for the Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -1mA$	-30	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	$I_D = -1mA$ referenced to 25°C	-	-24.1	-	$\text{mV}/^\circ\text{C}$
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -30V, V_{GS} = 0V$	-	-	-1	μA
Gate - Source leakage current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 10	μA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = -10V, I_D = -1mA$	-1.0	-	-2.5	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	$I_D = -1mA$ referenced to 25°C	-	3.3	-	$\text{mV}/^\circ\text{C}$
Static drain - source on - state resistance	$R_{DS(on)}^{*3}$	$V_{GS} = -10V, I_D = -2.5A$	-	65	84	$\text{m}\Omega$
		$V_{GS} = -4.5V, I_D = -1.2A$	-	100	130	
		$V_{GS} = -4V, I_D = -1.2A$	-	120	160	
Transconductance	g_{fs}^{*3}	$V_{DS} = -10V, I_D = -2.5A$	1.8	-	-	S

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

*2 Mounted on a ceramic board.

*3 Pulsed

● **Electrical characteristics** ($T_a = 25^\circ\text{C}$) <It is the same characteristics for the Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	$V_{GS} = 0V$	-	460	-	pF
Output capacitance	C_{oss}	$V_{DS} = -10V$	-	65	-	
Reverse transfer capacitance	C_{rss}	$f = 1\text{MHz}$	-	40	-	
Turn - on delay time	$t_{d(on)}^{*3}$	$V_{DD} \approx -15V, V_{GS} = -10V$	-	7	-	ns
Rise time	t_r^{*3}	$I_D = -1.2A$	-	20	-	
Turn - off delay time	$t_{d(off)}^{*3}$	$R_L = 12.5\Omega$	-	35	-	
Fall time	t_f^{*3}	$R_G = 10\Omega$	-	14	-	

● **Gate charge characteristics** ($T_a = 25^\circ\text{C}$) <It is the same characteristics for the Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g^{*3}	$V_{DD} \approx -15V, I_D = -2.5A$ $V_{GS} = -5V$	-	4.8	-	nC
Gate - Source charge	Q_{gs}^{*3}		-	1.8	-	
Gate - Drain charge	Q_{gd}^{*3}		-	1.2	-	

● **Body diode electrical characteristics** (Source-Drain) ($T_a = 25^\circ\text{C}$)

<It is the same characteristics for the Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	I_S	$T_a = 25^\circ\text{C}$	-	-	-0.8	A
Body diode pulse current	I_{SP}^{*1}		-	-	-6	
Forward voltage	V_{SD}^{*3}	$V_{GS} = 0V, I_S = -2.5A$	-	-	-1.2	V

● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve



Fig.2 Maximum Safe Operating Area

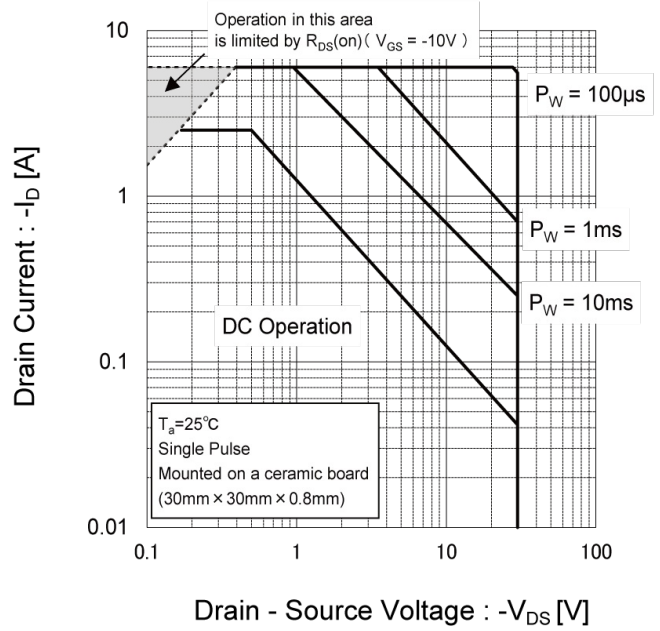


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

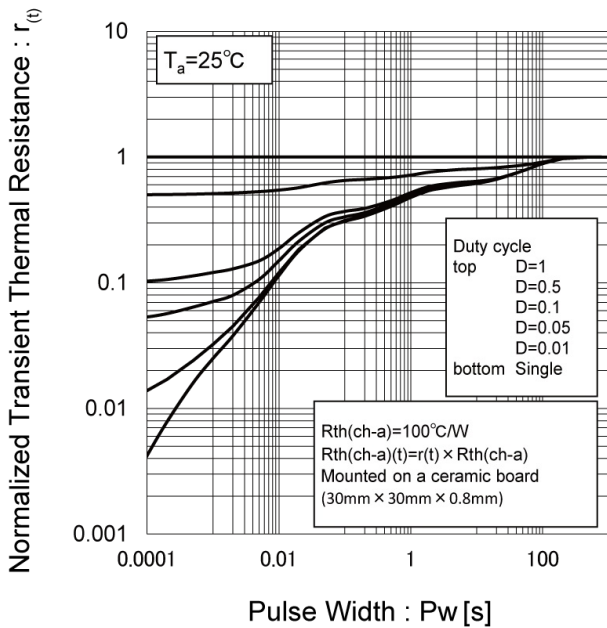
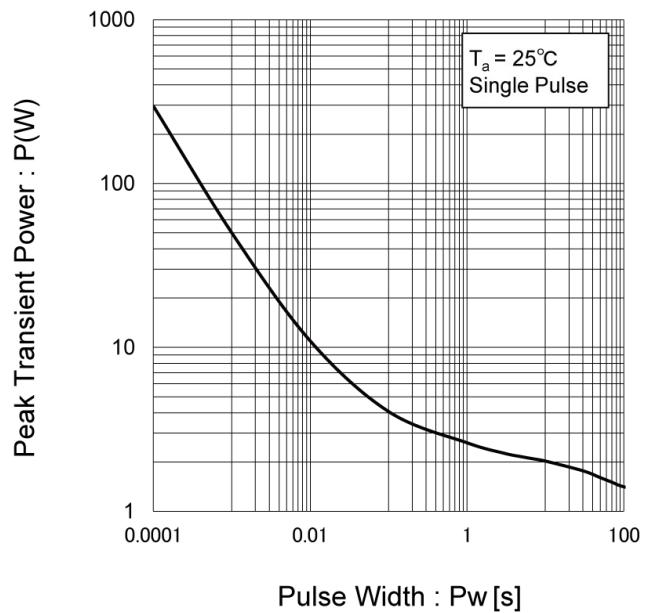


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

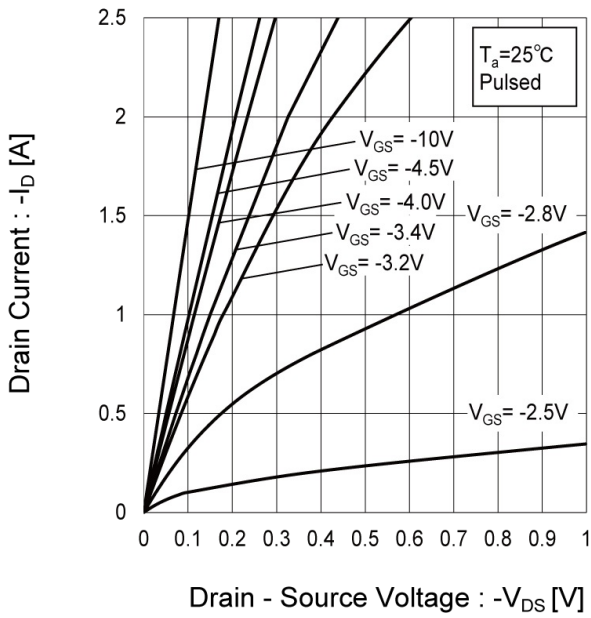


Fig.6 Typical Output Characteristics(II)

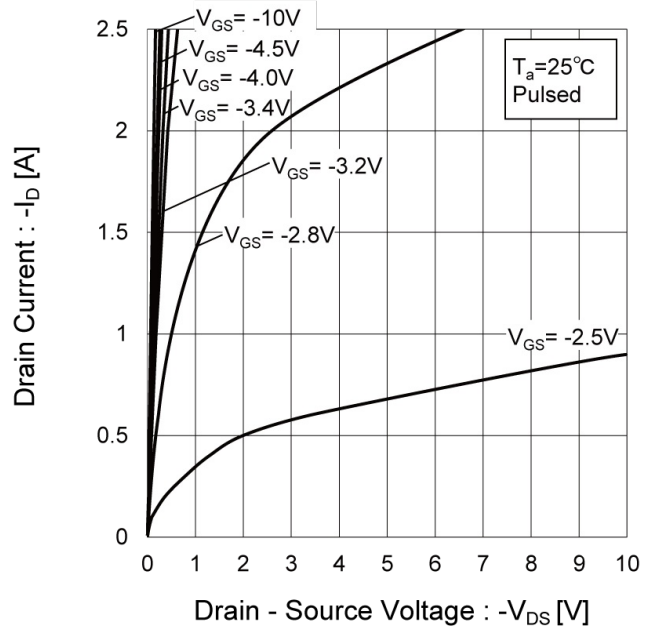
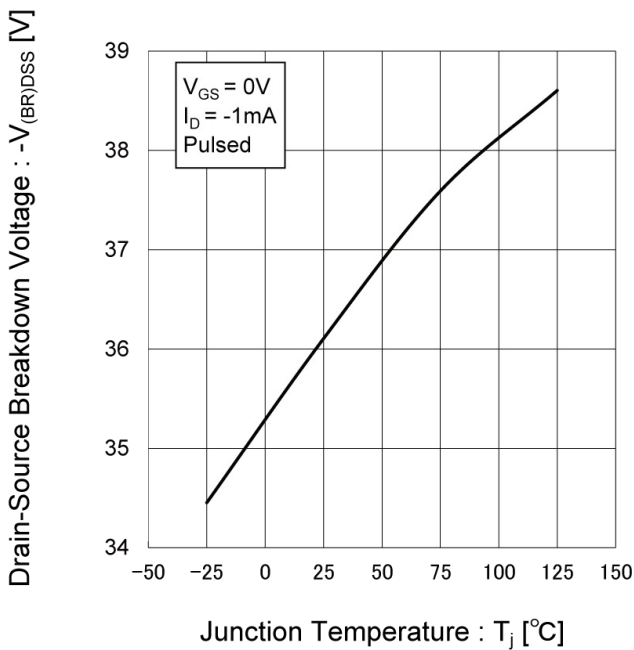


Fig.7 Breakdown Voltage vs. Junction Temperature



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

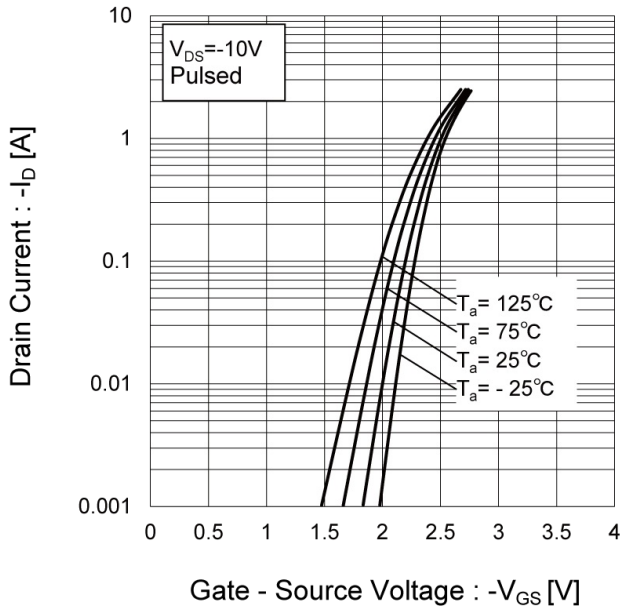


Fig.9 Gate Threshold Voltage vs. Junction Temperature

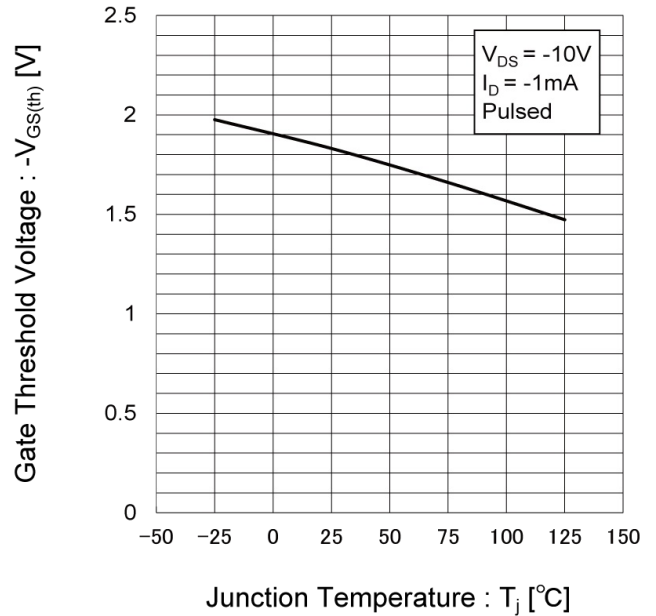
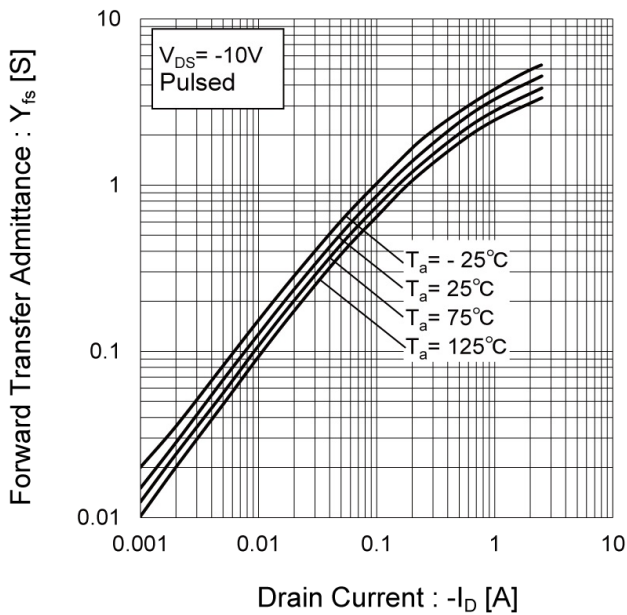


Fig.10 Transconductance vs. Drain Current



● Electrical characteristic curves

Fig.11 Drain Current Derating Curve

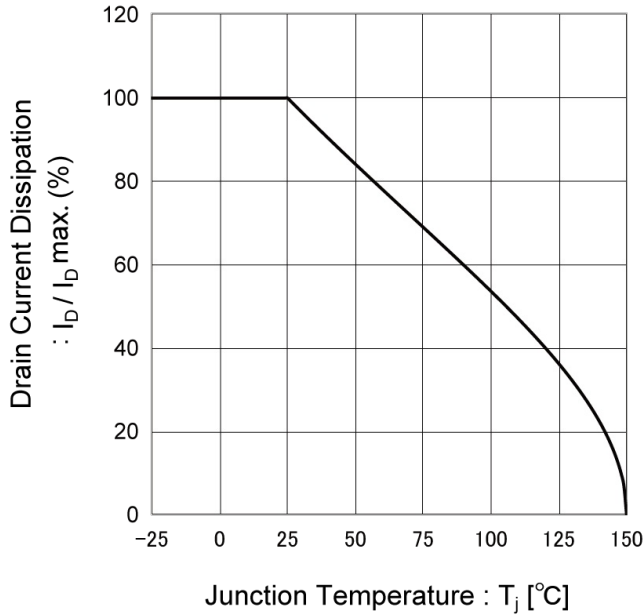


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

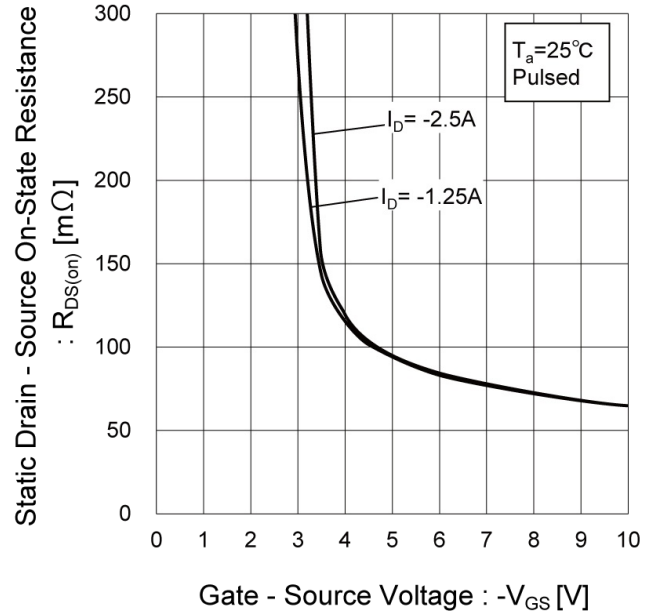
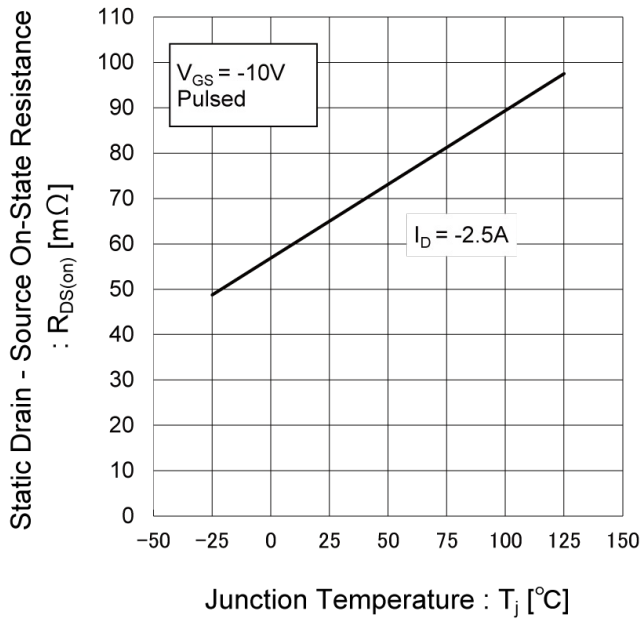


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



● Electrical characteristic curves

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

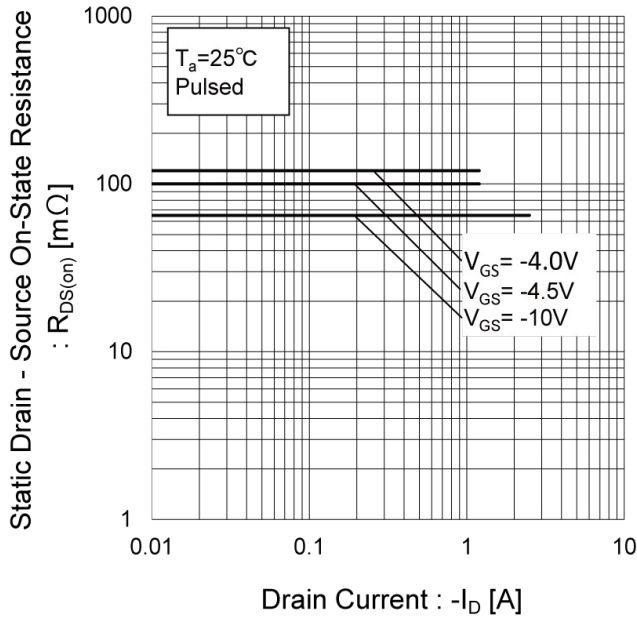


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

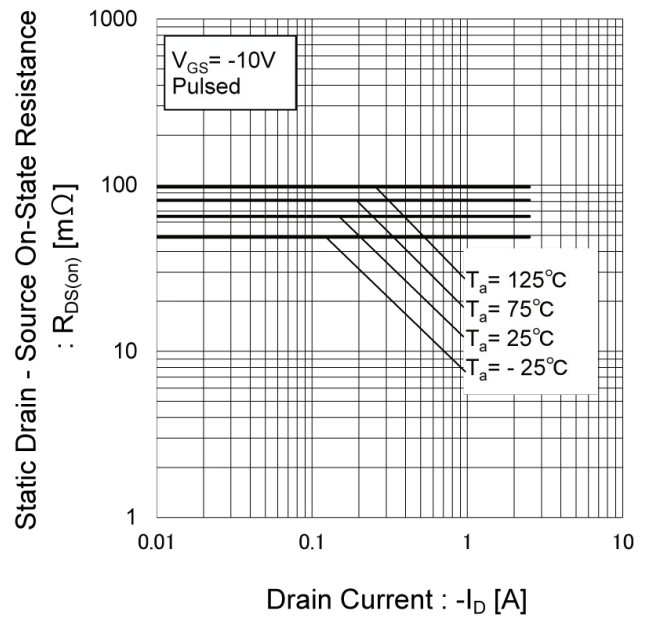


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)

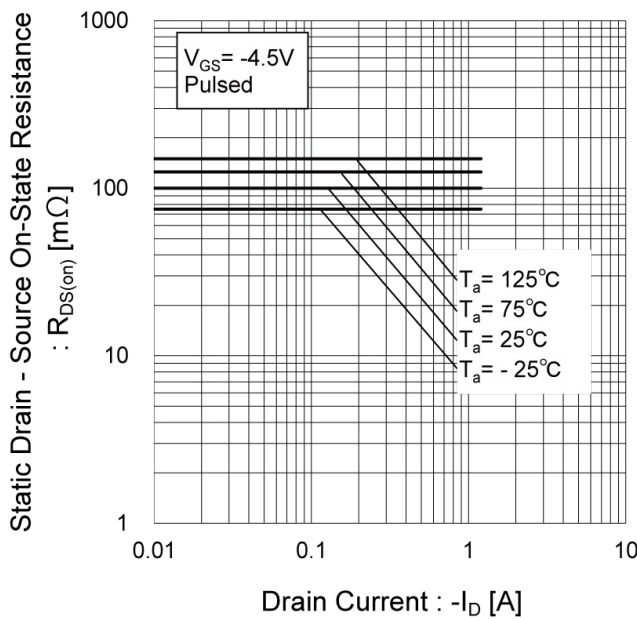
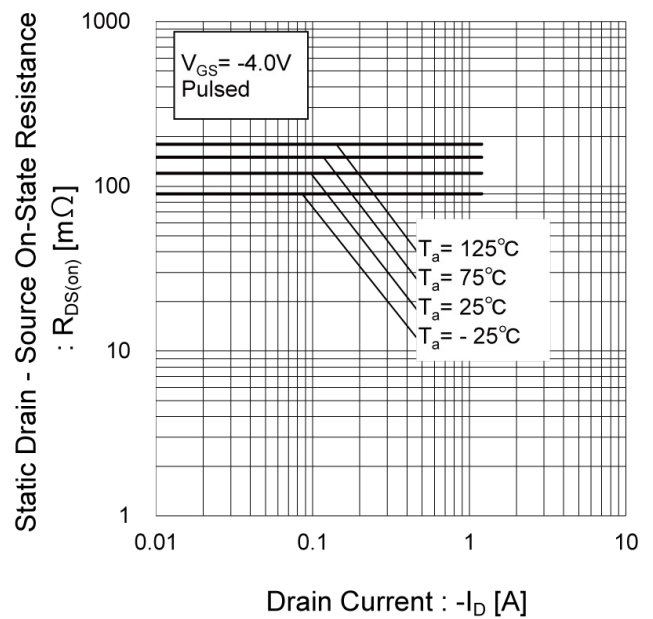


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current(IV)



●Electrical characteristic curves

Fig.18 Typical Capacitance vs. Drain - Source Voltage

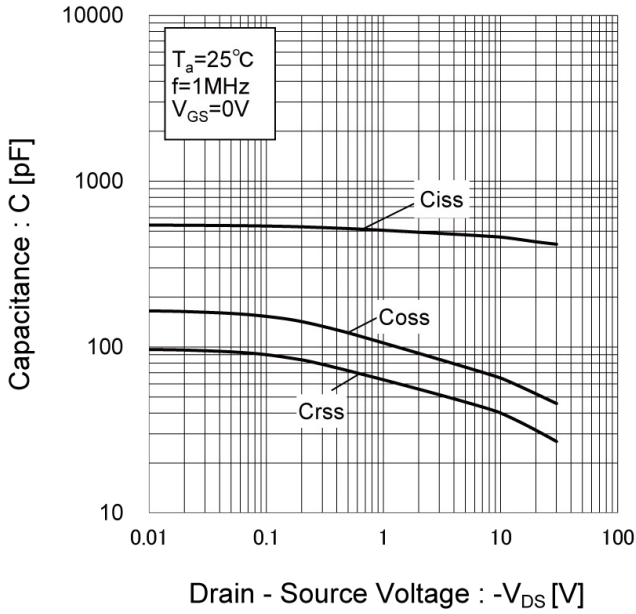


Fig.19 Switching Characteristics

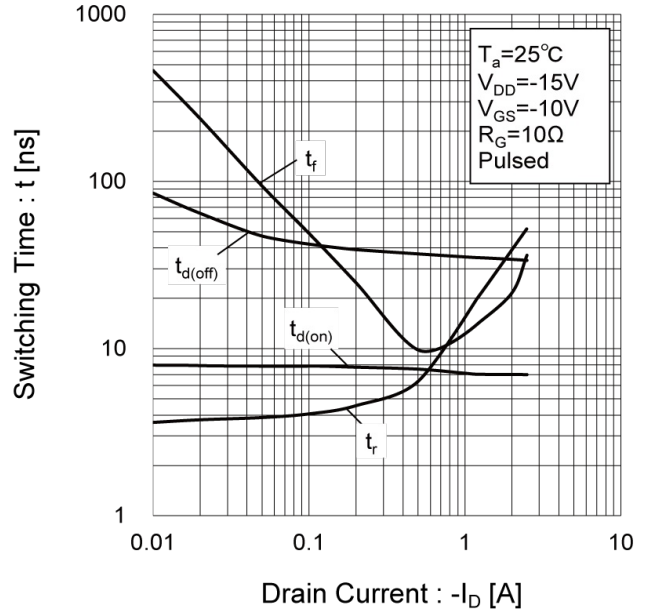


Fig.20 Dynamic Input Characteristics

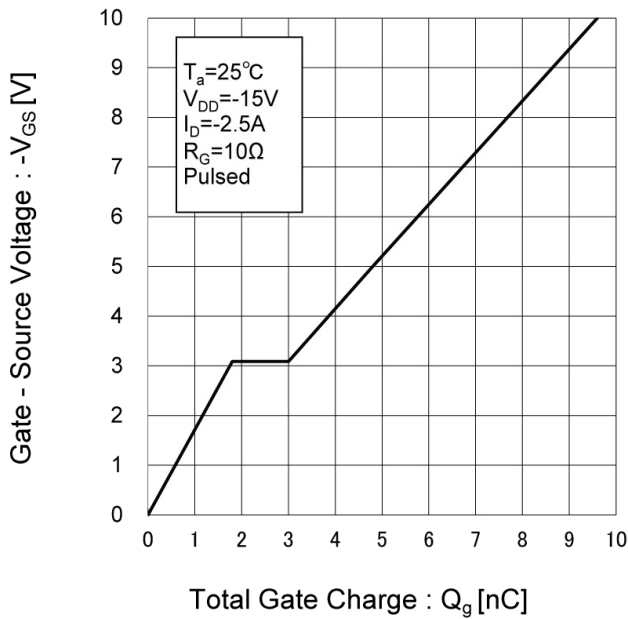
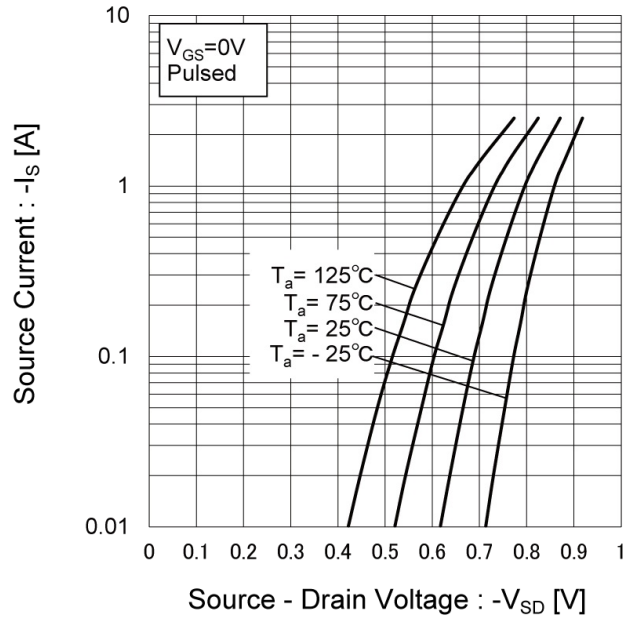


Fig.21 Source Current vs. Source Drain Voltage



● Measurement circuits <It is the same for the Tr1 and Tr2>

Fig.1-1 Switching Time Measurement Circuit

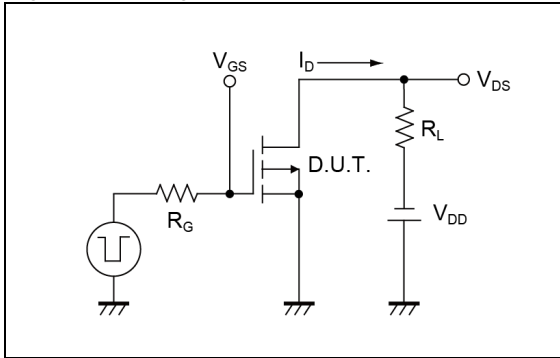


Fig.1-2 Switching Waveforms

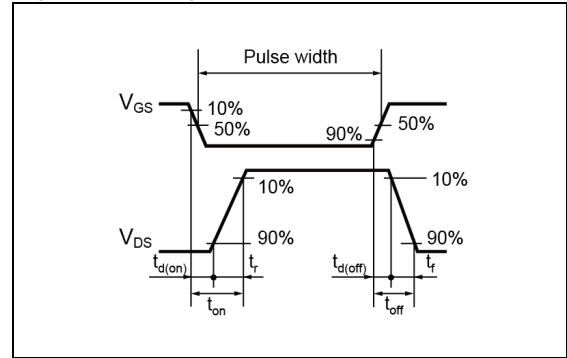


Fig.2-1 Gate Charge Measurement Circuit

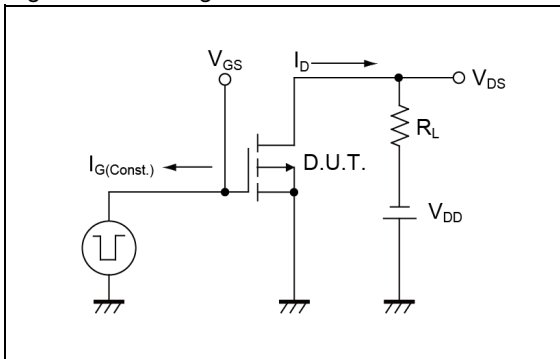
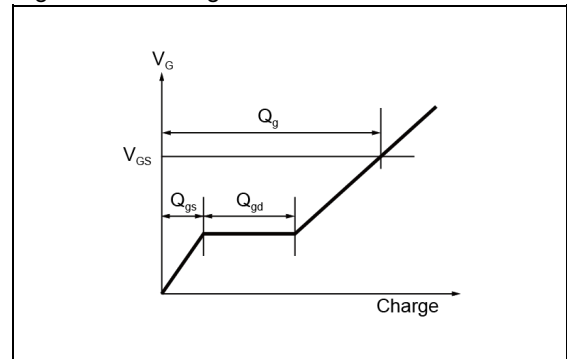


Fig.2-2 Gate Charge Waveform

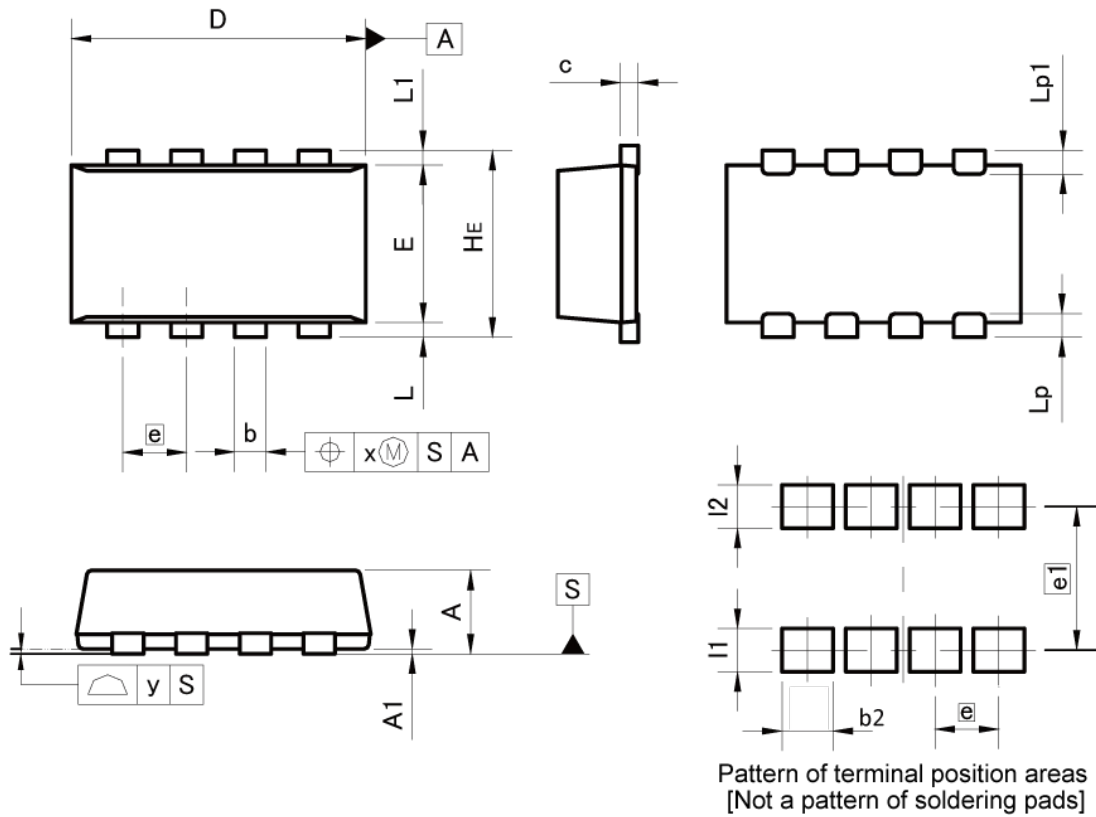


● Notice

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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