TT8K1

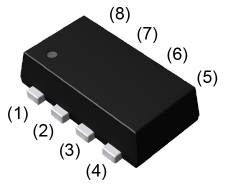
20V Nch + Nch Middle Power MOSFET

Datasheet

V_{DSS}	20V
$R_{DS(on)}$(Max.)	72mΩ
I_D	±2.5A
P_D	1.25W

●Outline

TSST8

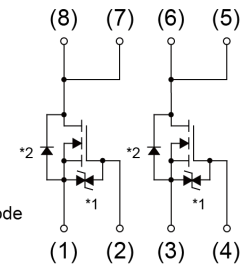


●Features

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

●Inner circuit

(1) Tr1 Source
(2) Tr1 Gate
(3) Tr2 Source
(4) Tr2 Gate
(5) Tr2 Drain
(6) Tr2 Drain
(7) Tr1 Drain
(8) Tr1 Drain
*1 ESD Protection Diode
*2 Body Diode



●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	180
	Tape width (mm)	8
	Basic ordering unit (pcs)	3000
	Taping code	TR
	Marking	K01

●Application

Switching

●Absolute maximum ratings (T_a = 25°C) <It is the same ratings for the Tr1 and Tr2>

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	20	V
Continuous drain current		I_D	±2.5	A
Pulsed drain current		$I_{D,pulse}$ *1	±10	A
Gate - Source voltage		V_{GSS}	±10	V
Power dissipation	total	P_D *2	1.25	W
	element		1.0	
	total	P_D *3	0.6	
Junction temperature		T_j	150	℃
Range of storage temperature		T_{stg}	-55 to +150	℃

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●Thermal resistance

Parameter		Symbol	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance, junction - ambient	total	R_{thJA} *2	-	-	100	°C/W
	element		-	-	125	
	total	R_{thJA} *3	-	-	208	

●Electrical characteristics (T_a = 25°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	20	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = 1mA referenced to 25°C	-	29.0	-	mV/°C
Zero gate voltage drain current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V	-	-	1	μA
Gate - Source leakage current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±10V	-	-	±10	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = 10V, 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°C	-	-1.6	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}$ *4	V_{GS} = 4.5V, I_D = 2.5A	-	52	72	mΩ
		V_{GS} = 2.5V, I_D = 2.5A	-	65	90	
		V_{GS} = 1.8V, I_D = 1.2A	-	85	120	
		V_{GS} = 1.5V, I_D = 0.5A	-	100	140	
Forward Transfer Admittance	$\|Y_{fs}\|$ *4	V_{DS} = 10V, I_D = 2.5A	2.7	-	-	S

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●**Electrical characteristics** (T_a = 25°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	-	260	-	pF
Output capacitance	C_{oss}	V_{DS} = 10V	-	65	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	35	-	
Turn - on delay time	$t_{d(on)}$ *4	V_{DD} ≃ 10V, V_{GS} = 4.5V	-	9	-	ns
Rise time	t_r *4	I_D = 1.2A	-	17	-	
Turn - off delay time	$t_{d(off)}$ *4	R_L = 8.3Ω	-	28	-	
Fall time	t_f *4	R_G = 10Ω	-	17	-	

●**Gate charge characteristics** (T_a = 25°C) <It is the same characteristics for the Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *4	V_{DD} ≃ 10V	-	3.6	-	nC
Gate - Source charge	Q_{gs} *4	I_D = 2.5A	-	0.7	-	
Gate - Drain charge	Q_{gd} *4	V_{GS} = 4.5V	-	0.6	-	

●**Body diode electrical characteristics** (Source-Drain) (T_a = 25°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℃	-	-	0.8	A
Body diode pulse current	I_{SP} *1		-	-	10	
Forward voltage	V_{SD} *4	V_{GS} = 0V, I_S = 2.5A	-	-	1.2	V

*1 Pw≦10μs , Duty cycle≦1%

*2 Mounted on a ceramic board (30×30×0.8mm)

*3 Mounted on a FR4 (20×20×0.8mm)

*4 Pulsed

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●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

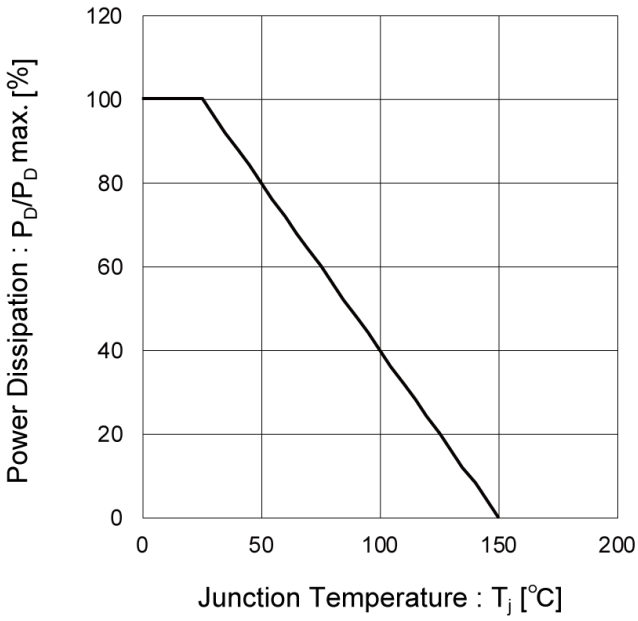


Fig.2 Maximum Safe Operating Area

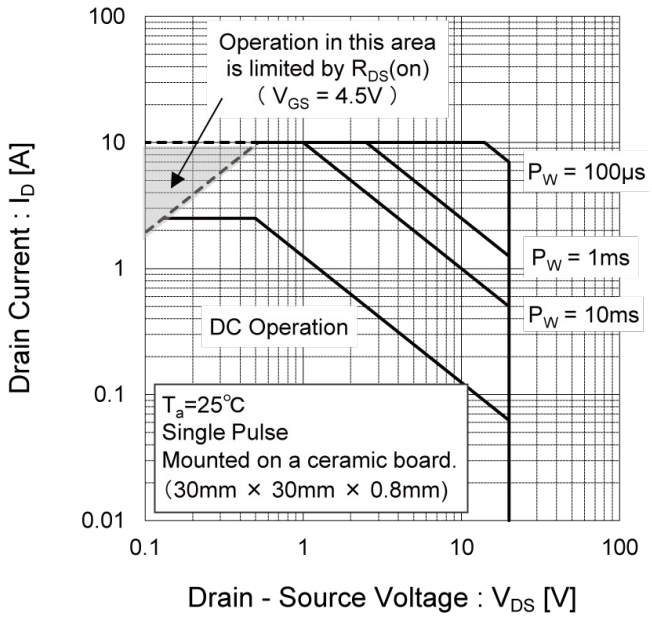


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

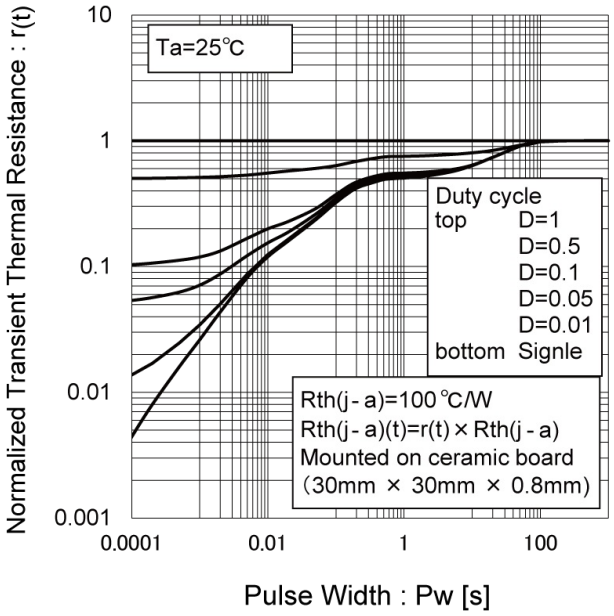
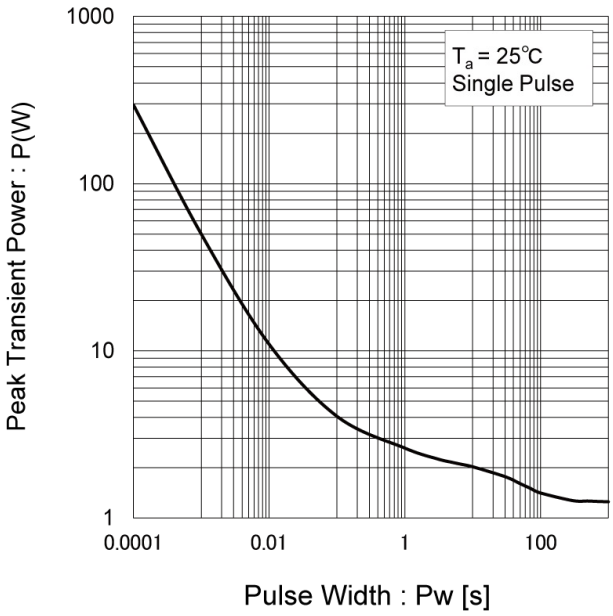


Fig.4 Single Pulse Maximum Power dissipation



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●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

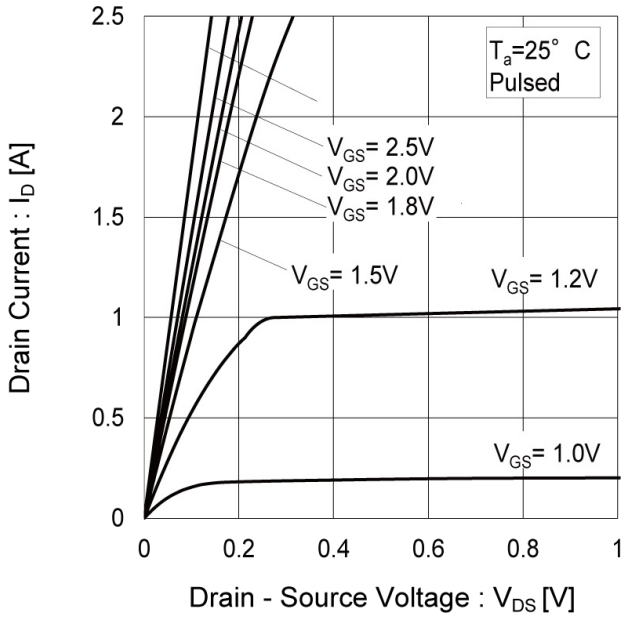


Fig.6 Typical Output Characteristics(II)

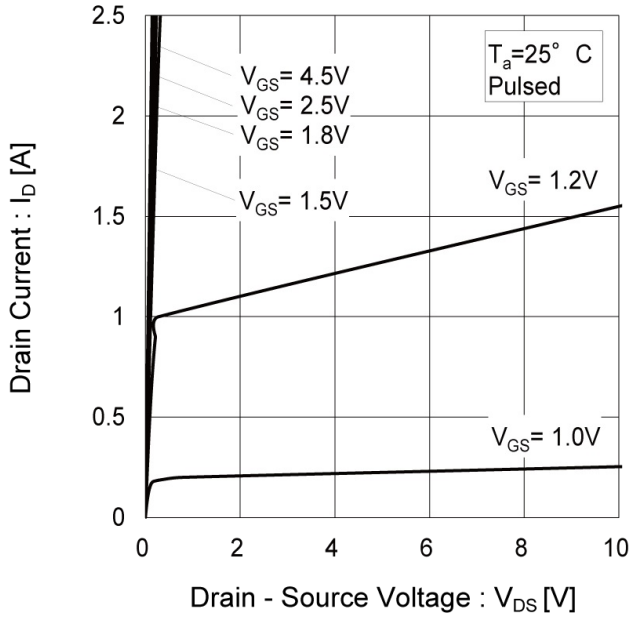


Fig.7 Breakdown Voltage vs. Junction Temperature

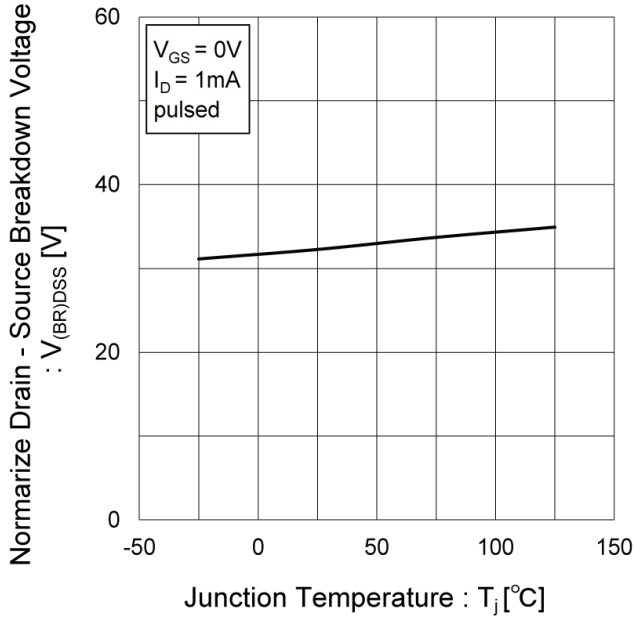
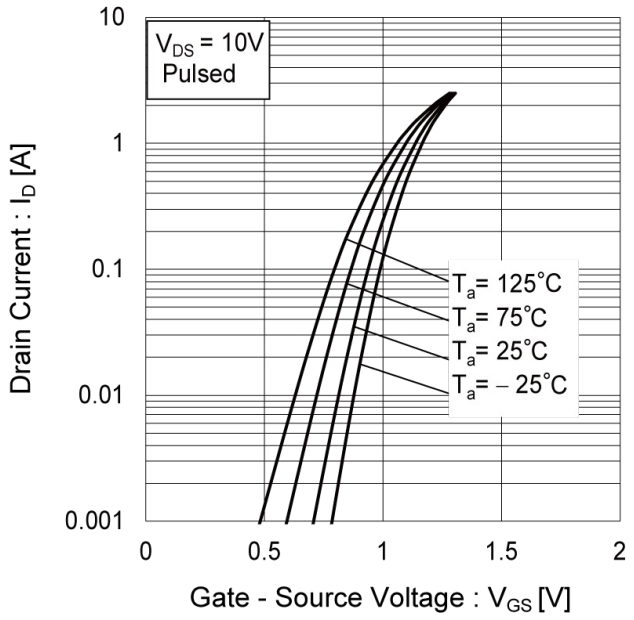


Fig.8 Typical Transfer Characteristics



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●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

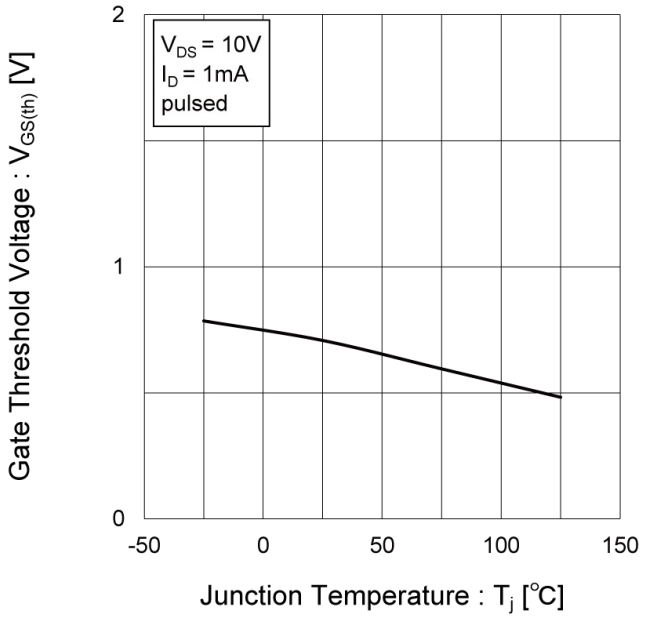


Fig.10 Forward Transfer Admittance vs. Drain Current

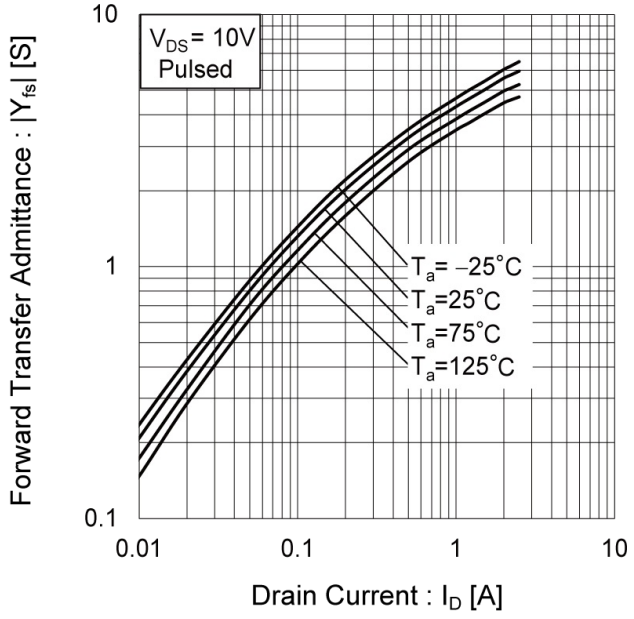


Fig.11 Drain Current Derating Curve

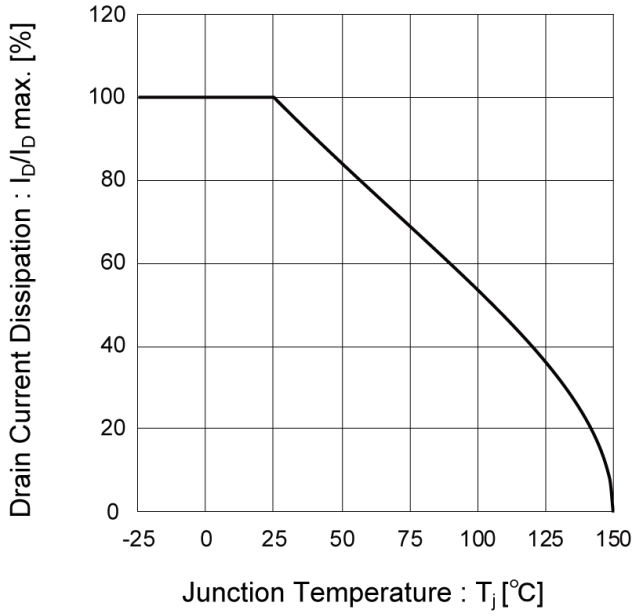
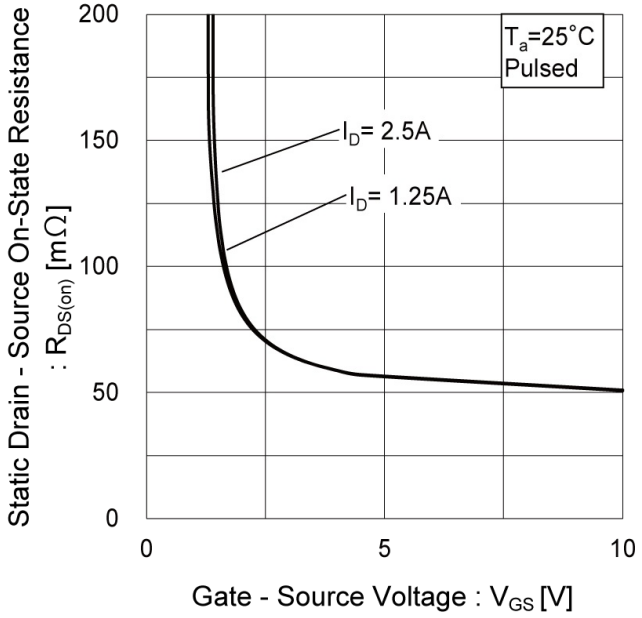


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



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●Electrical characteristic curves

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

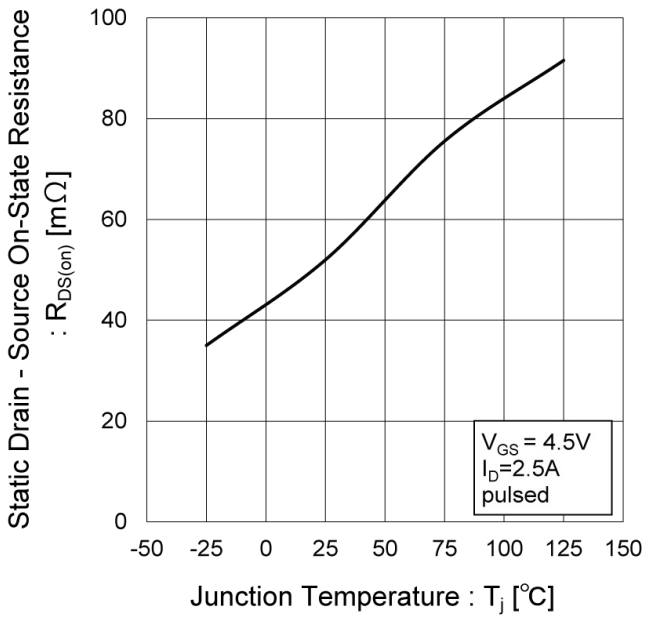
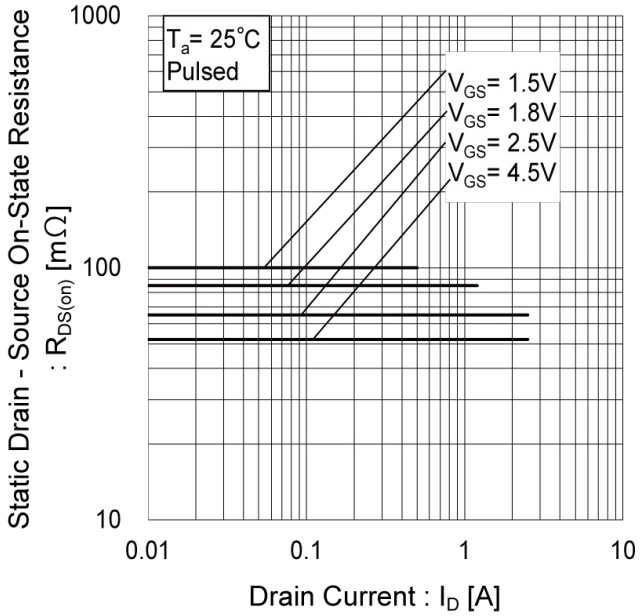


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)



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●Electrical characteristic curves

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

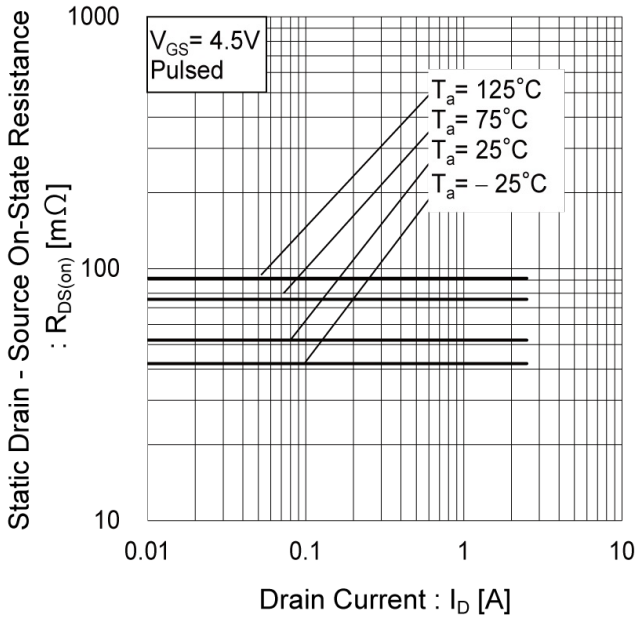


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current (III)

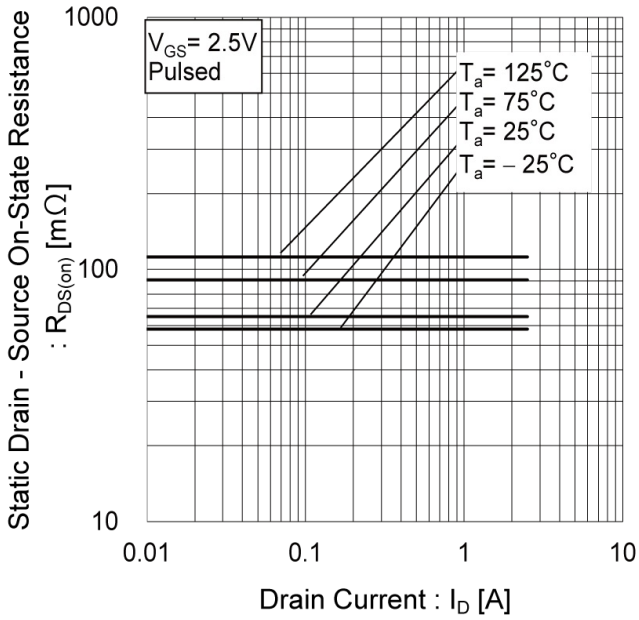


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current (IV)

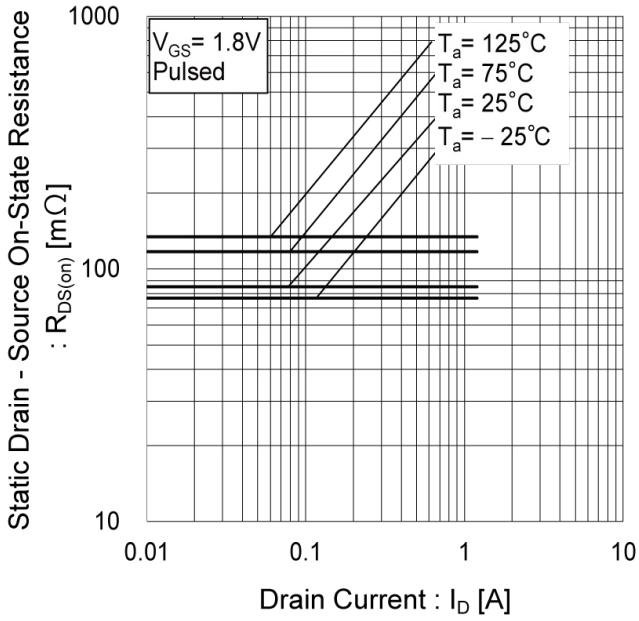
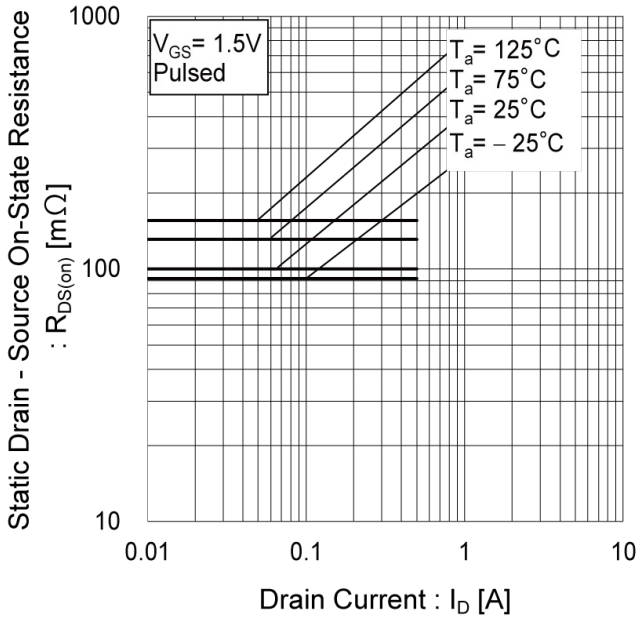


Fig.18 Static Drain - Source On - State Resistance vs. Drain Current (V)



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●Electrical characteristic curves

Fig.19 Typical Capacitance vs. Drain - Source Voltage

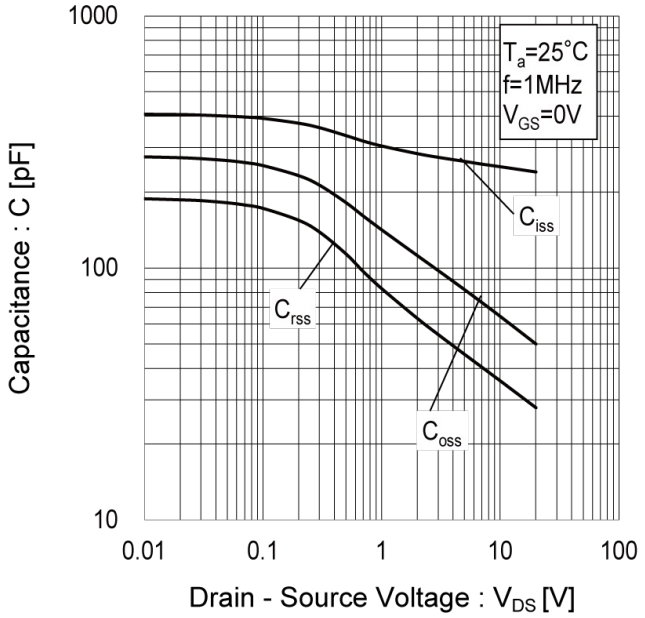


Fig.20 Switching Characteristics

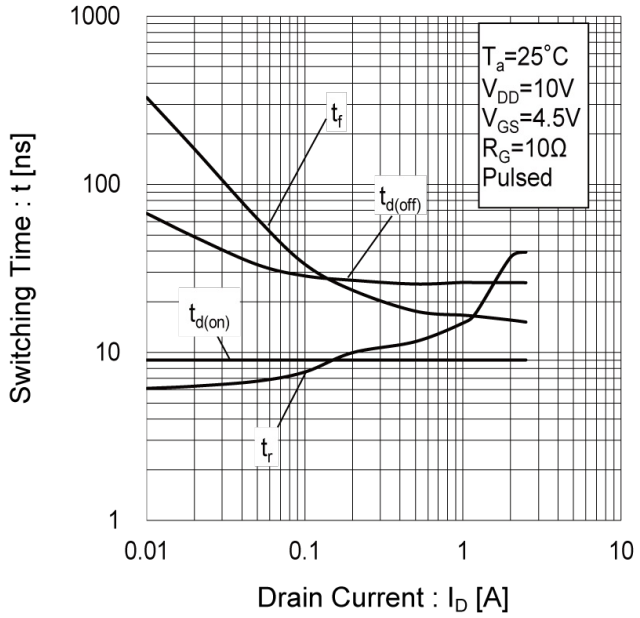


Fig.21 Dynamic Input Characteristics

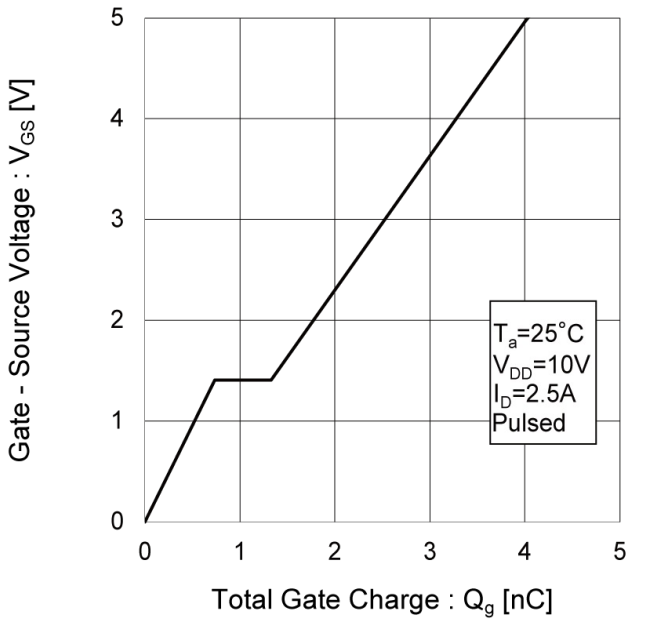
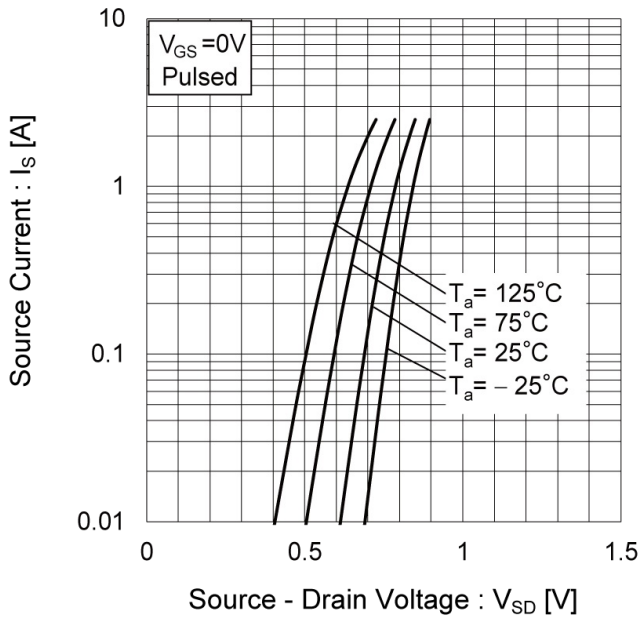


Fig.22 Source Current vs. Source Drain Voltage



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

Fig. 1-1 SWITCHING TIME MEASUREMENT CIRCUIT

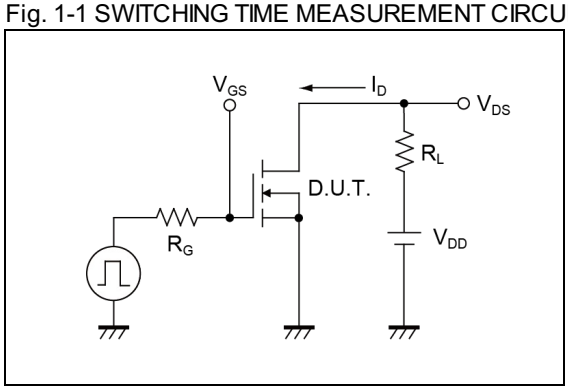


Fig. 1-2 SWITCHING WAVEFORMS

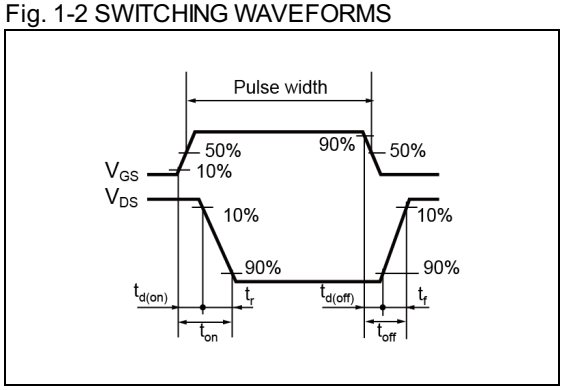


Fig. 2-1 GATE CHARGE MEASUREMENT CIRCUIT

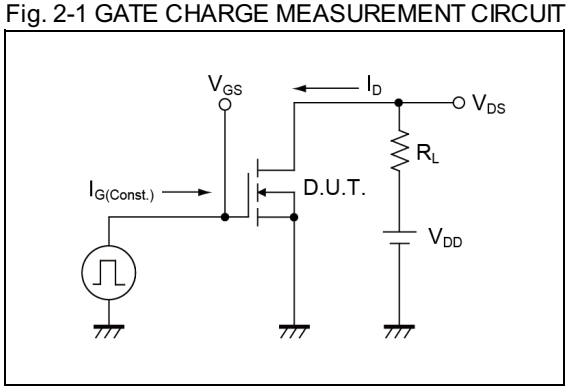
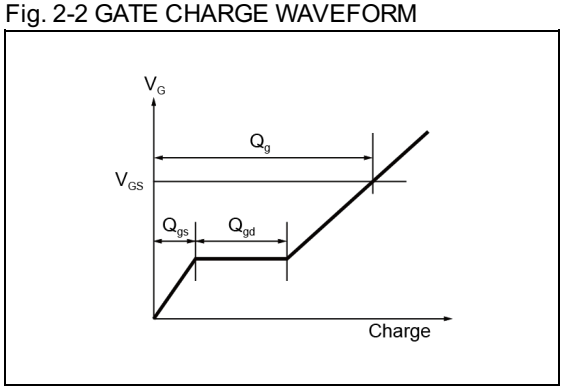


Fig. 2-2 GATE CHARGE WAVEFORM



●Notice

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

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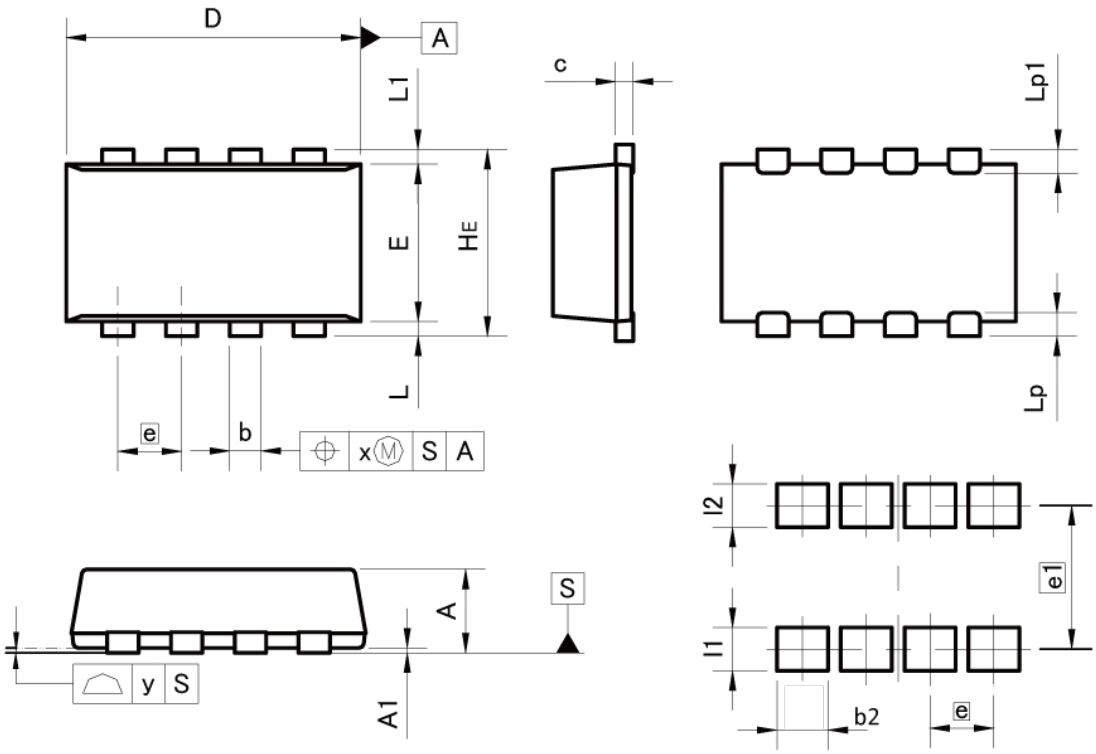
●Dimensions

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	
l1	–	0.44	–	0.017
l2	–	0.44	–	0.017

Dimension in mm/inches

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Notes

1) The information contained herein is subject to change without notice.

2) Before you use our Products, please contact our sales representative and verify the latest specifications :

3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
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4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties. ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.

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7) The Products specified in this document are not designed to be radiation tolerant.

8) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.

9) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.

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