RT1A050ZP

Pch -12V -5A Middle Power MOSFET

Datasheet

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

● **Outline**

TSST8

● **Features**

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

● **Inner circuit**

(1) Drain
(2) Drain
(3) Drain
(4) Gate
(5) Source
(6) Drain
(7) Drain
(8) Drain

*1 ESD Protection Diode
*2 Body Diode

● **Application**

Switching

● **Packaging specifications**

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

● **Absolute maximum ratings** (T_a = 25°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

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA} [*2]	-	-	100	℃/W
	R_{thJA} [*3]	-	-	208	℃/W

●Electrical characteristics (T_a = 25°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	$\dfrac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = -1mA referenced to 25℃	-	-21.9	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} = -12V, V_{GS} = 0V	-	-	-1	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±10V, V_{DS} = 0V	-	-	±10	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = -6V, I_D = -1mA	-0.3	-	-1.0	V
Gate threshold voltage temperature coefficient	$\dfrac{\Delta V_{GS(th)}}{\Delta T_j}$	I_D = -1mA referenced to 25℃	-	2.4	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$ [*4]	V_{GS} = -4.5V, I_D = -5A	-	19	26	mΩ
		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 Pw≦10μs, Duty cycle≦1%

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

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

*4 Pulsed

● **Electrical characteristics** (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	2800	-	pF
Output capacitance	C_{oss}	V_{DS} = -6V	-	340	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	310	-	
Turn - on delay time	$t_{d(on)}$[4]	$V_{DD} \simeq$ -6V, V_{GS} = -4.5V	-	12	-	ns
Rise time	t_r[4]	I_D = -2.5A	-	95	-	
Turn - off delay time	$t_{d(off)}$[4]	$R_L \simeq 2.4\Omega$	-	410	-	
Fall time	t_f[4]	R_G = 10Ω	-	220	-	

● **Gate charge characteristics** (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g[4]	$V_{DD} \simeq$ -6V, I_D = -5A, V_{GS} = -4.5V	-	34	-	nC
Gate - Source charge	Q_{gs}[4]		-	6.0	-	
Gate - Drain charge	Q_{gd}[4]		-	5.0	-	

● **Body diode electrical characteristics** (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	I_S	T_a = 25°C	-	-	-1	A
Body diode pulse current	I_{SP}[1]		-	-	-20	A
Forward voltage	V_{SD}[4]	V_{GS} = 0V, I_S = -5A	-	-	-1.2	V

● **Electrical characteristic curves**
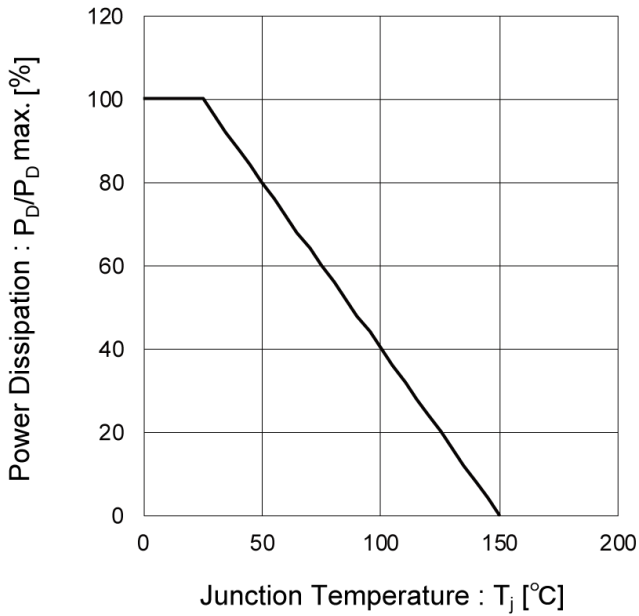
Fig.1 Power Dissipation Derating Curve
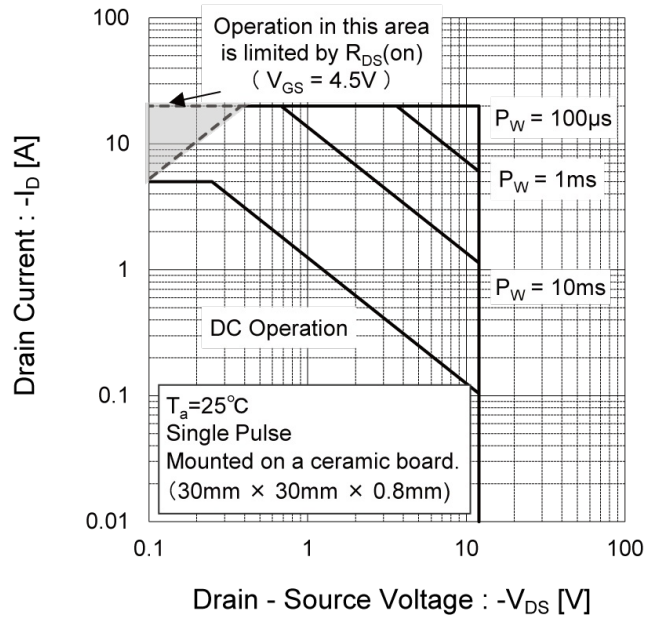
Fig.2 Maximum Safe Operating Area

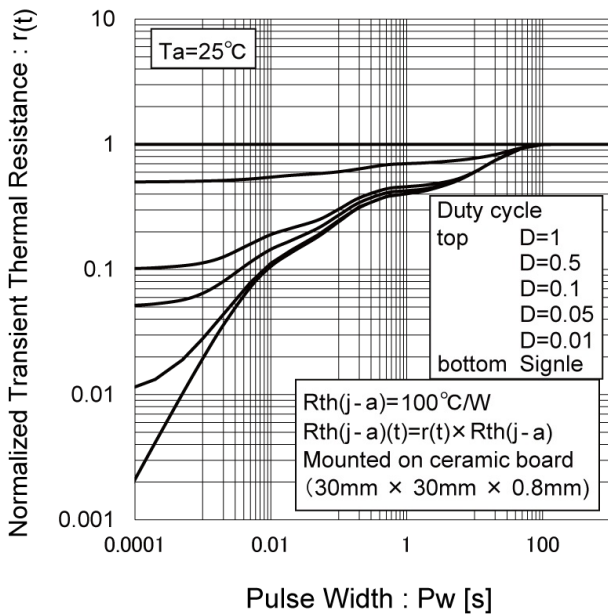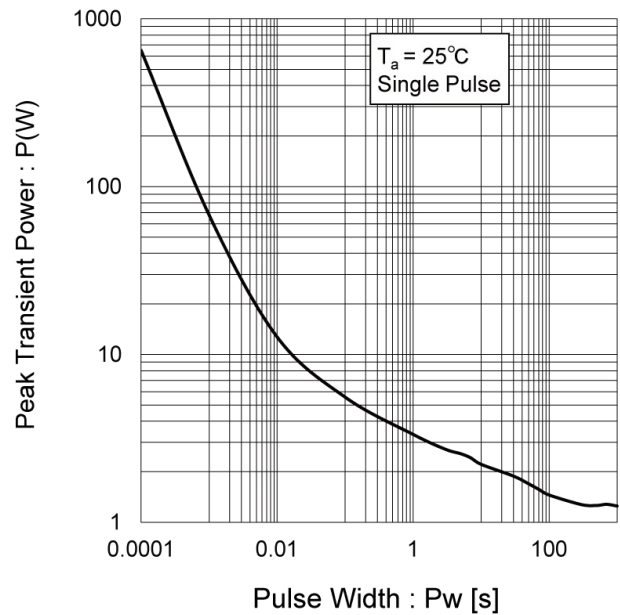Fig.3 Normalized Transient Thermal
Resistance vs. Pulse Width

Fig.4 Single Pulse Maximum Power
dissipation

● **Electrical characteristic curves**

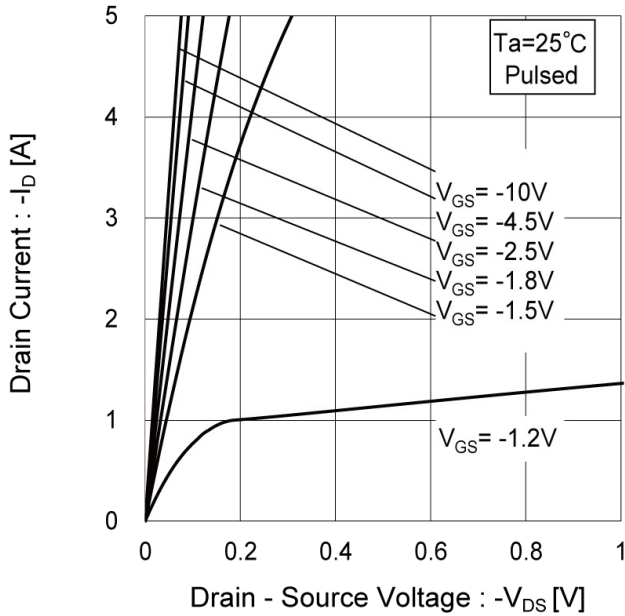Fig.5 Typical Output Characteristics(I)

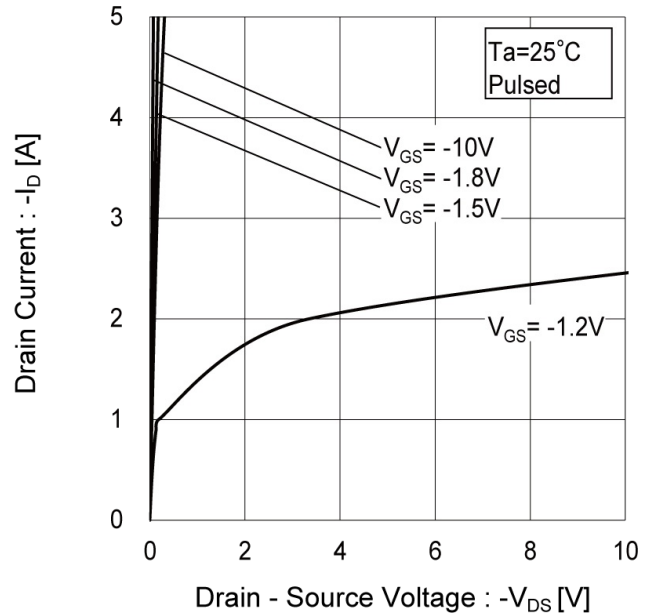
Fig.6 Typical Output Characteristics(II)

Fig.7 Breakdown Voltage vs.
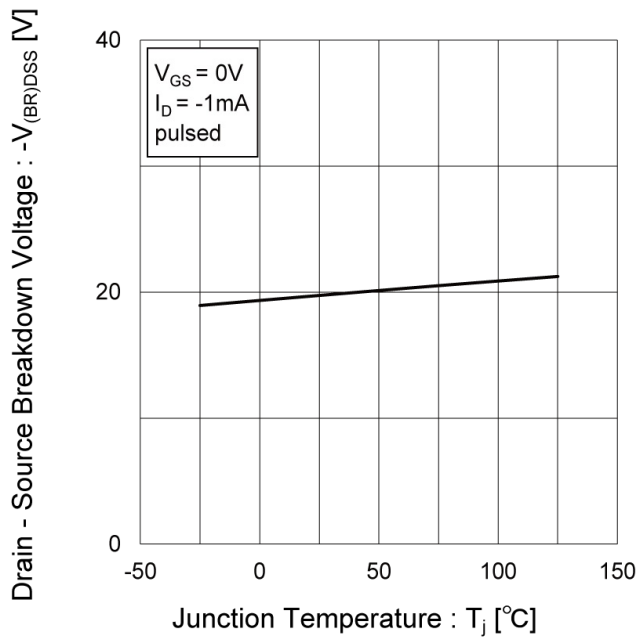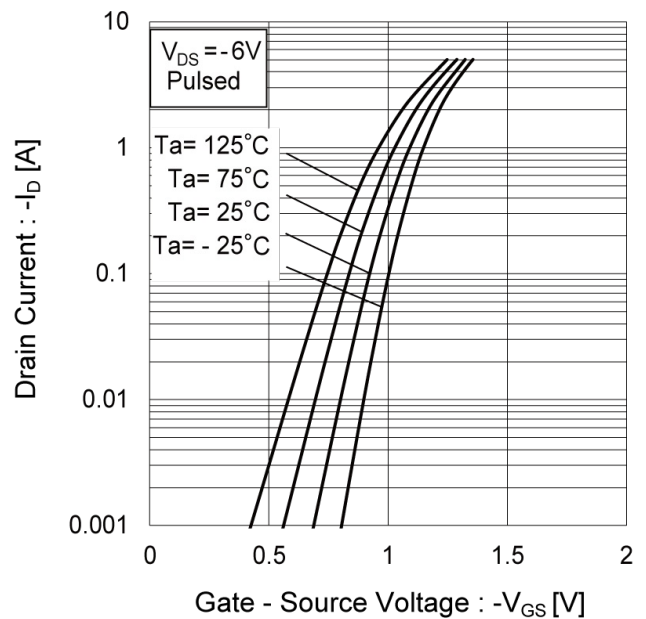Junction Temperature

Fig.8 Typical Transfer Characteristics

● **Electrical characteristic curves**

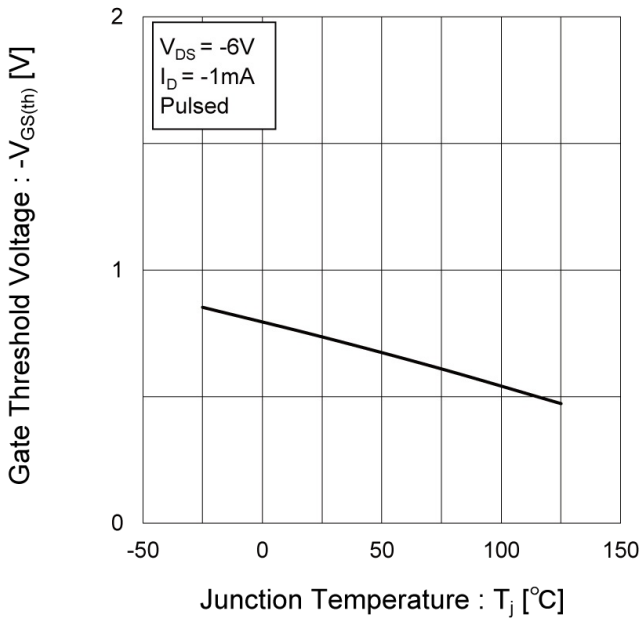Fig.9 Gate Threshold Voltage vs.
Junction Temperature

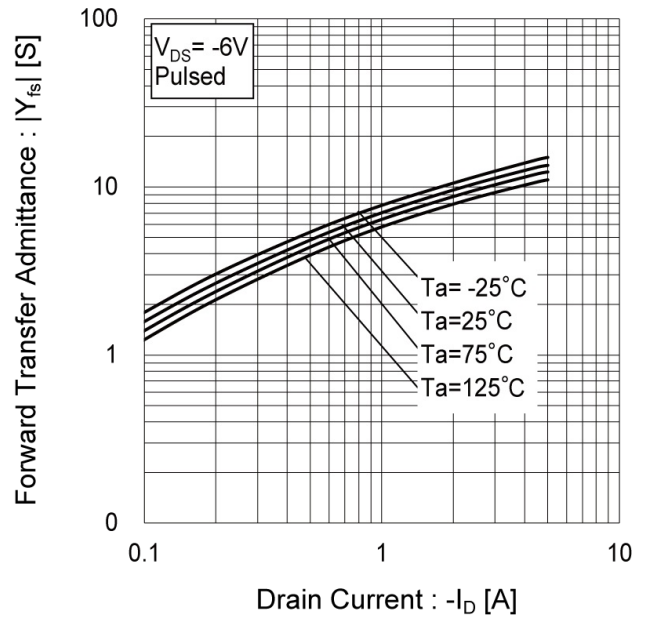Fig.10 Forward Transfer Admittance vs.
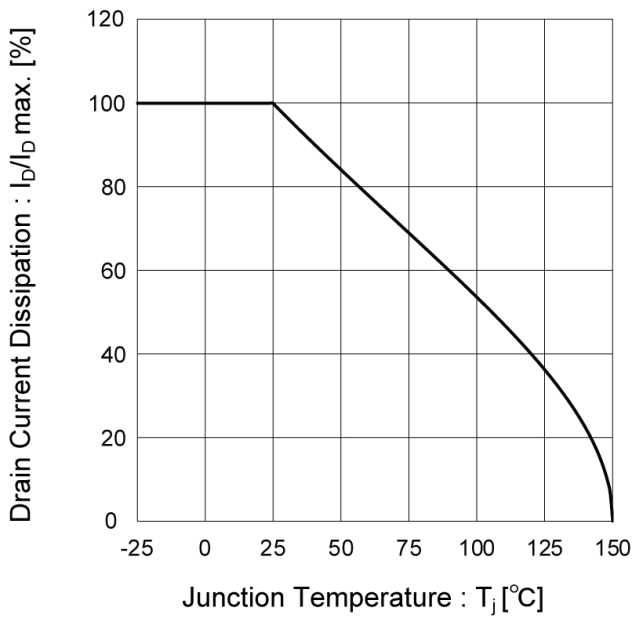Drain Current

Fig.11 Drain Current Derating Curve

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

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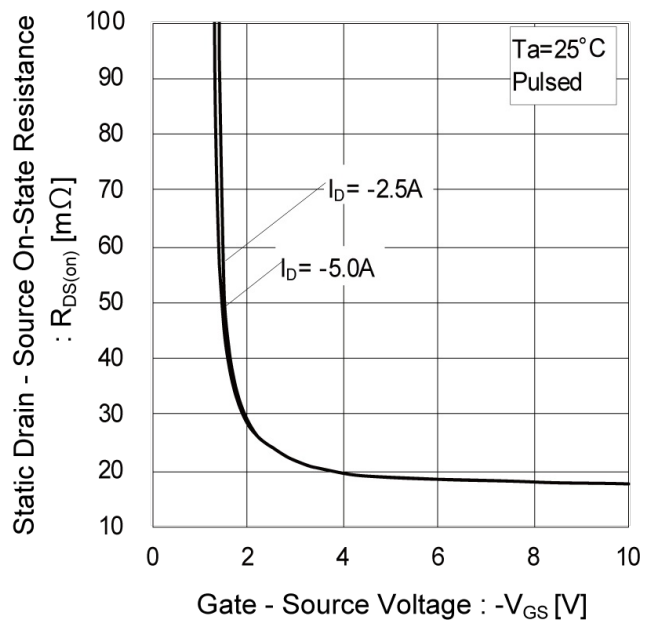
● **Electrical characteristic curves**

Fig.13 Static Drain - Source On - State
Resistance vs. Junction Temperature
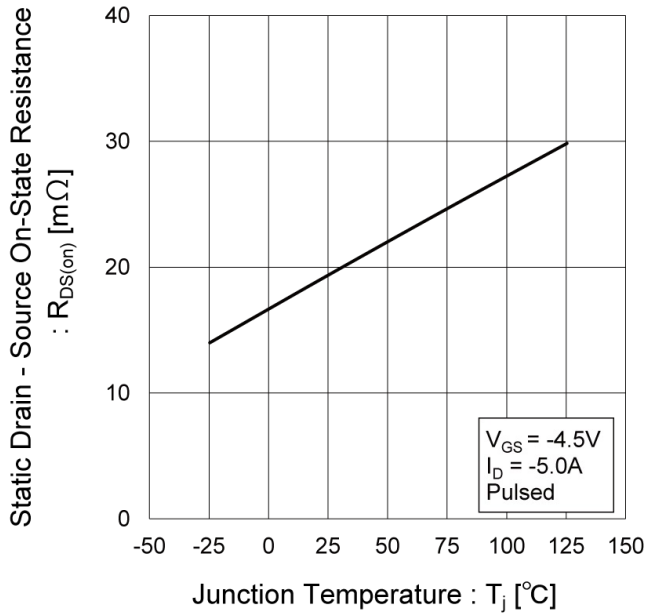
Fig.14 Static Drain - Source On - State
Resistance vs. Drain Current(I)

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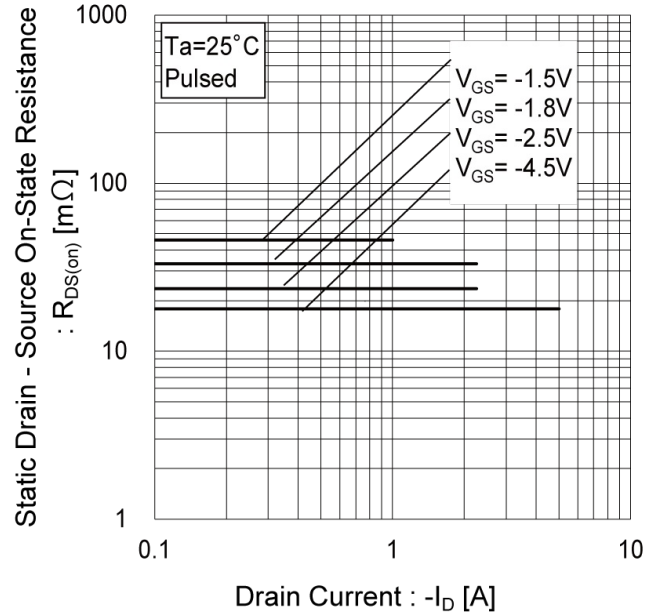
●**Electrical characteristic curves**

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

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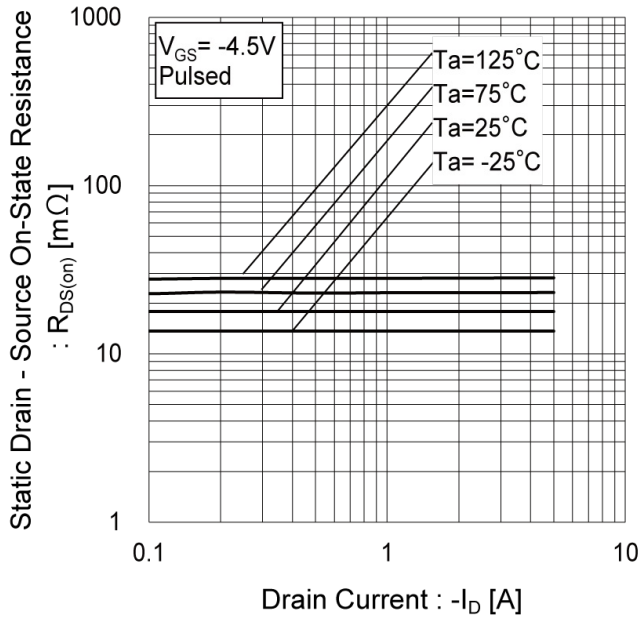

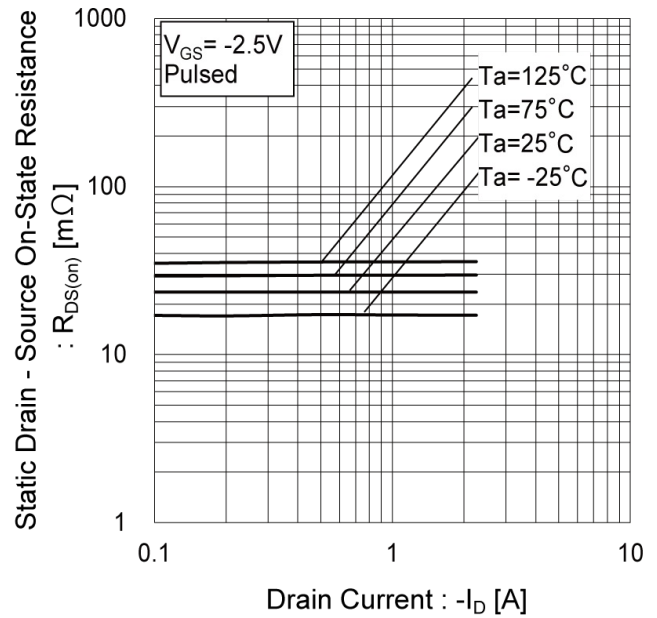Fig.17 Static Drain - Source On - State
     Resistance vs. Drain Current (IV)

Fig.18 Static Drain - Source On - State
     Resistance vs. Drain Current (V)
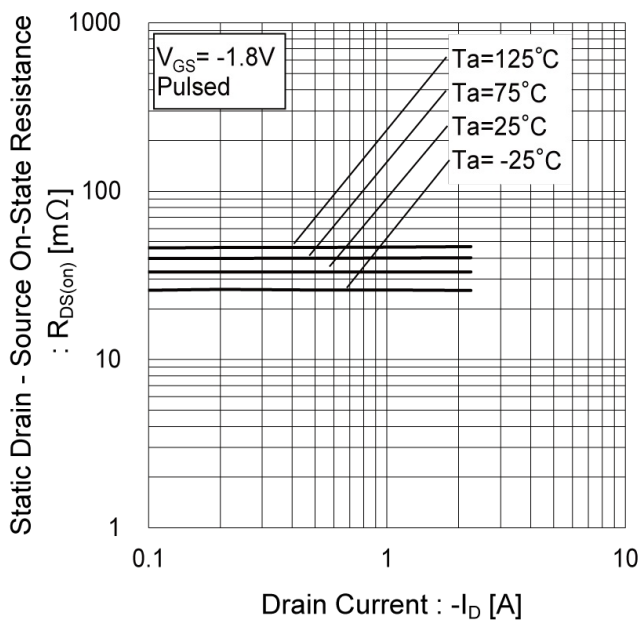
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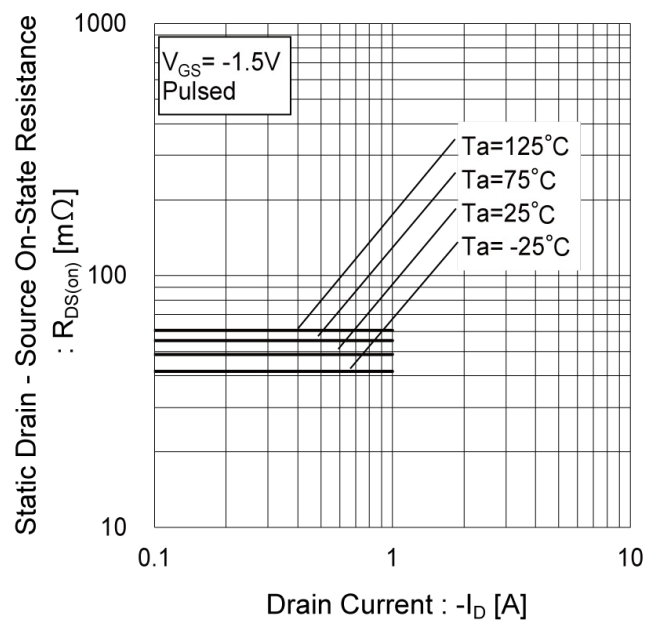
● **Electrical characteristic curves**

Fig.19 Typical Capacitance vs.
Drain - Source Voltage
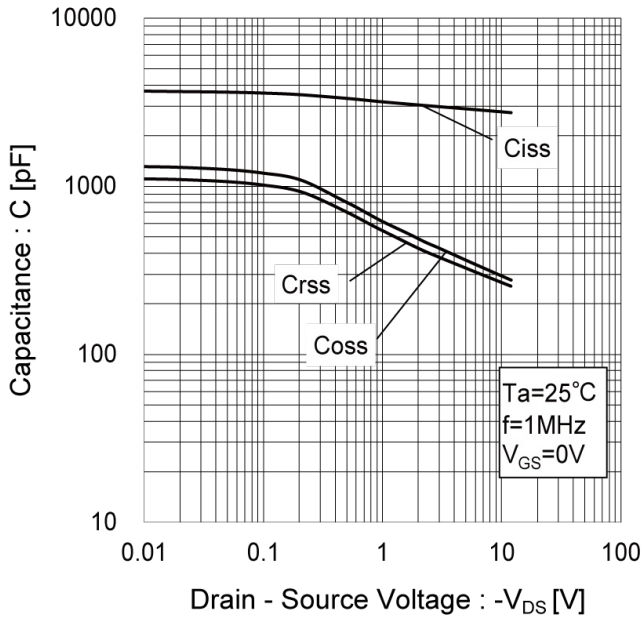
Fig.20 Switching Characteristics

Fig.21 Dynamic Input Characteristics

Fig.22 Source Current vs.
Source Drain Voltage

● **Measurement circuits**

Fig. 1-1 SWITCHING TIME MEASUREMENT CIRCUIT

Fig. 1-2 SWITCHING WAVEFORMS
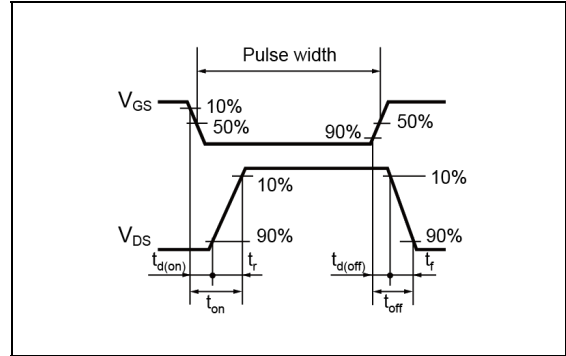
Fig. 2-1 GATE CHARGE MEASUREMENT CIRCUIT

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]

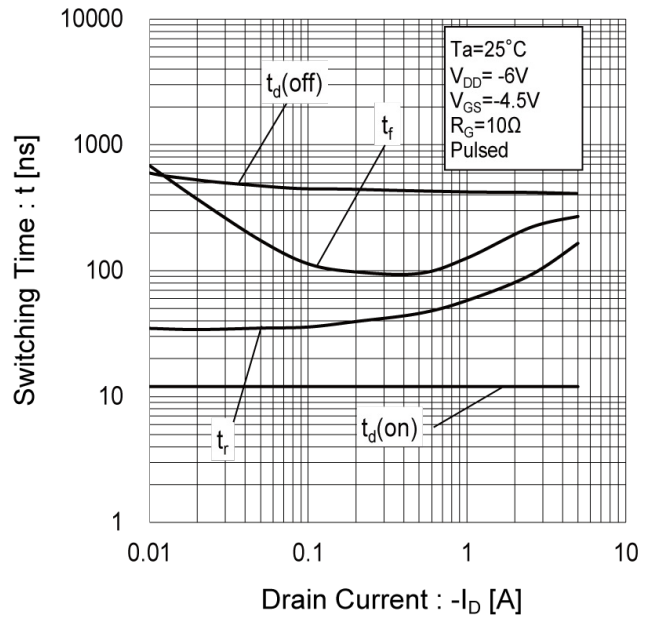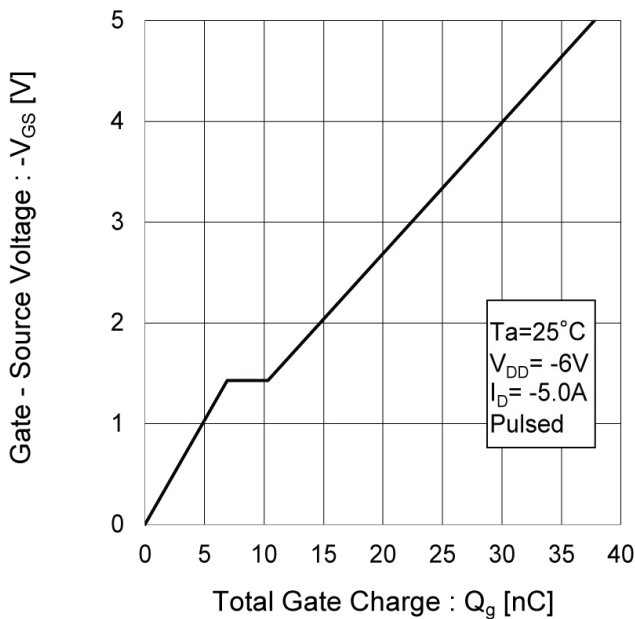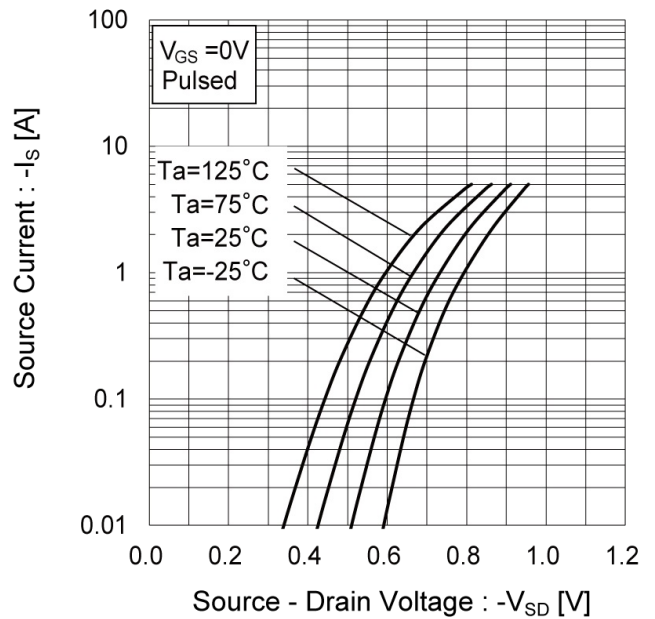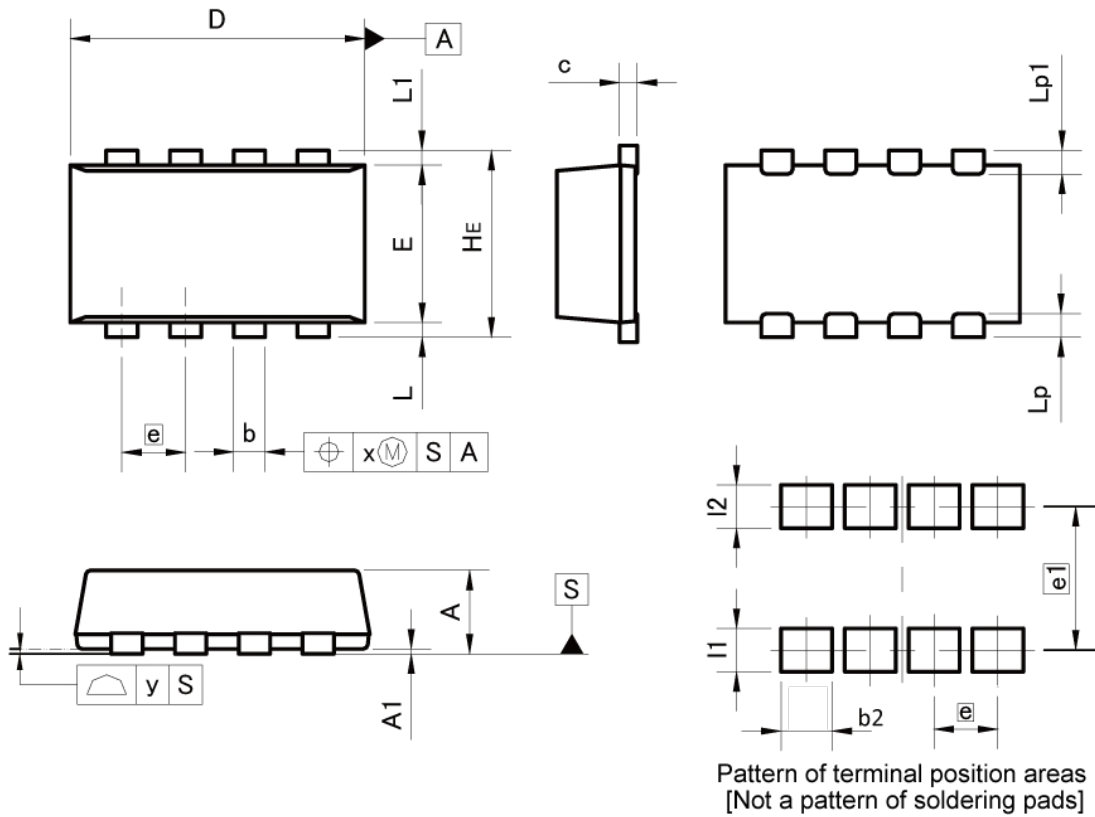| DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.75	0.85	0.030	0.033
A1	0.00	0.05	0.000	0.002
b	0.22	0.42	0.009	0.017
c	0.12	0.22	0.005	0.009
D	2.90	3.10	0.114	0.122
E	1.50	1.70	0.059	0.067
e	0.65		0.026	
HE	1.80	2.00	0.071	0.079
L	0.05	0.25	0.002	0.010
L1	0.05	0.25	0.002	0.010
Lp	0.15	0.34	0.006	0.013
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	
l1	–	0.44	–	0.017
l2	–	0.44	–	0.017

Dimension in mm/inches

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ROHM
SEMICONDUCTOR

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