RQ5E025AT

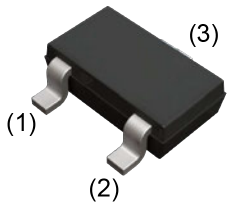
Pch -30V -2.5A Middle Power MOSFET

Datasheet

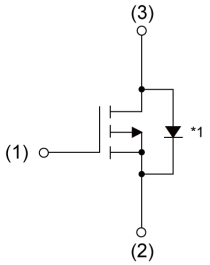
V_{DSS}	-30V
$R_{DS(on)}$(Max.)	91mΩ
I_D	±2.5A
P_D	1W

●Outline

TSMT3



●Inner circuit



(1) Gate
(2) Source
(3) Drain

*1 Body Diode

●Features

1) Low on - resistance.
2) Small Surface Mount Package (TSMT3).
3) Pb-free lead plating ; RoHS compliant

●Packaging specifications

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

●Application

Switching

●Absolute maximum ratings (T_a = 25°C)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	-30	V
Continuous drain current	I_D	±2.5	A
Pulsed drain current	$I_{D,pulse}$ *2	±12	A
Gate - Source voltage	V_{GSS}	±20	V
Avalanche energy, single pulse	E_{AS} *3	4.5	mJ
Avalanche current	I_{AS} *3	-2.5	A
Power dissipation	P_D *4	1	W
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	R_{thJA} *4	-	125	-	℃/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	-30	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = -1mA referenced to 25℃	-	-22	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} = -30V, V_{GS} = 0V	-	-	-1	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, 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℃	-	2.9	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$ *5	V_{GS} = -10V, I_D = -2.5A	-	70	91	mΩ
		V_{GS} = -4.5V, I_D = -2.5A	-	104	135	
Transconductance	g_{fs} *5	V_{DS} = -5V, I_D = -2.5A	2.1	-	-	S

*1 Limited only by maximum temperature allowed.

*2 Pw ≤ 10μs, Duty cycle ≤ 1%

*3 L ≃ 1mH, V_{DD} = -15V, R_G = 25Ω, STARTING T_{ch} = 25℃ Fig.3-1,3-2

*4 Mounted on a ceramic boad (30×30×0.8mm)

*5 Pulsed

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●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	220	-	pF
Output capacitance	C_{oss}	V_{DS} = -15V	-	45	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	35	-	
Turn - on delay time	$t_{d(on)}$ *5	V_{DD} ≃ -15V, V_{GS} = -10V	-	6.5	-	ns
Rise time	t_r *5	I_D = -1.25A	-	8.5	-	
Turn - off delay time	$t_{d(off)}$ *5	R_L = 12Ω	-	22	-	
Fall time	t_f *5	R_G = 10Ω	-	5.5	-	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
Total gate charge	Q_g *5	V_{DD} ≃ -15V I_D = -2.5A	V_{GS} = -10V	-	5.4	-	nC
			V_{GS} = -4.5V	-	2.7	-	
Gate - Source charge	Q_{gs} *5			-	0.8	-	
Gate - Drain charge	Q_{gd} *5			-	1.0	-	

●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 *1	T_a = 25℃	-	-	-0.8	A
Body diode pulse current	I_{SP} *2		-	-	-12	
Forward voltage	V_{SD} *5	V_{GS} = 0V, I_S = -0.8A	-	-	-1.2	V

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●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

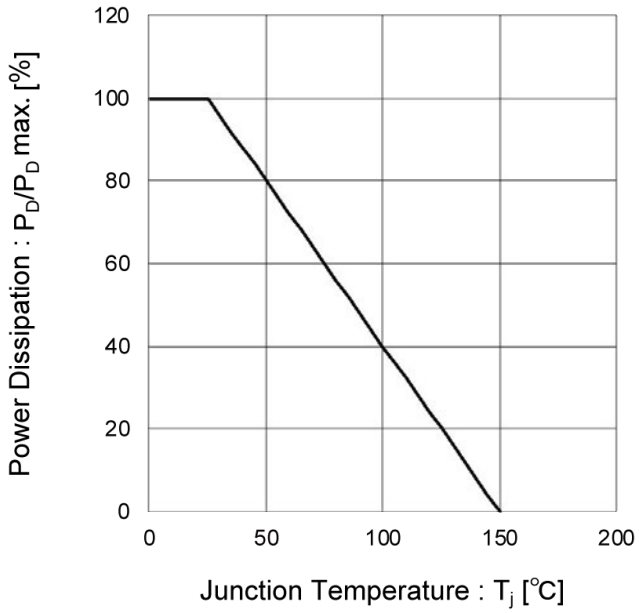


Fig.2 Maximum Safe Operating Area

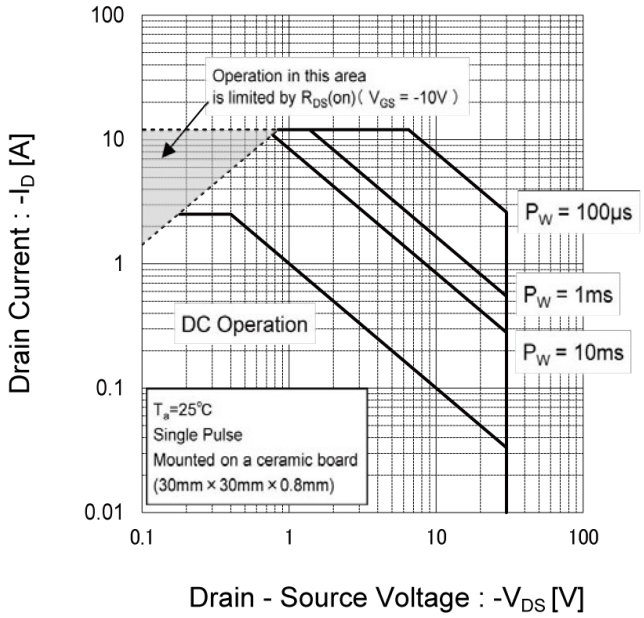


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

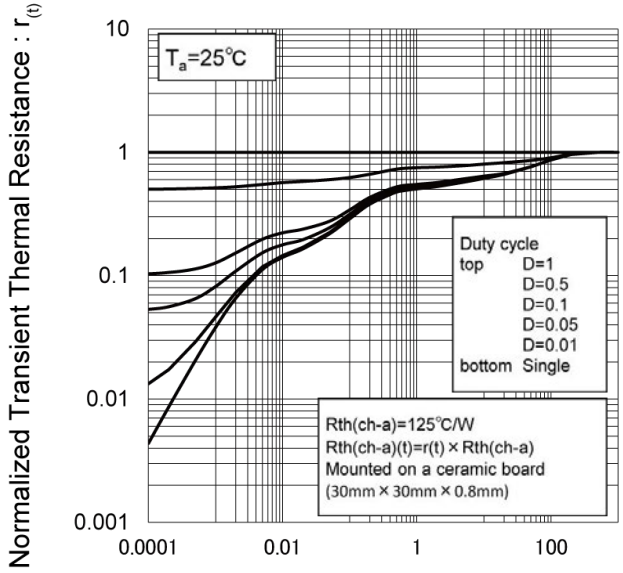
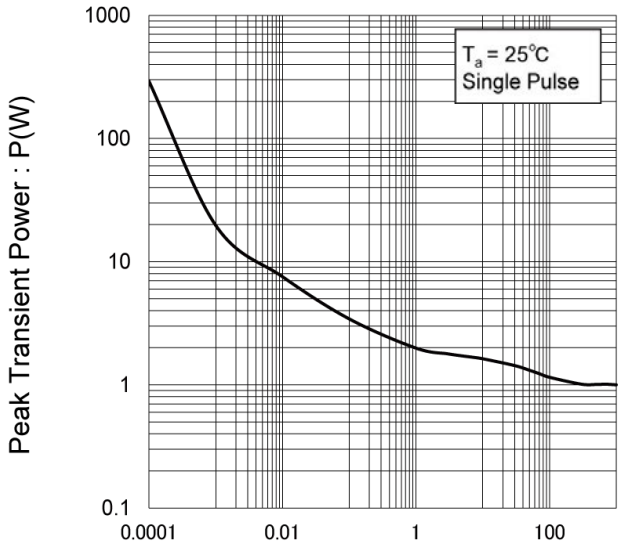


Fig.4 Single Pulse Maximum Power dissipation



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●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

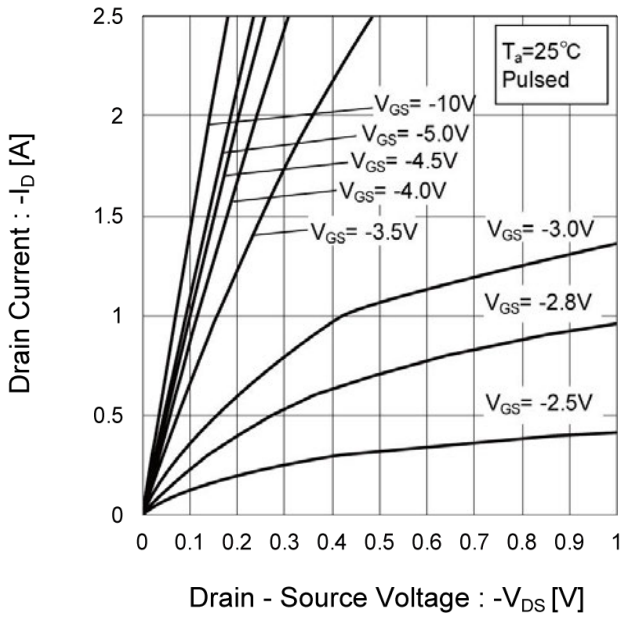


Fig.6 Typical Output Characteristics(II)

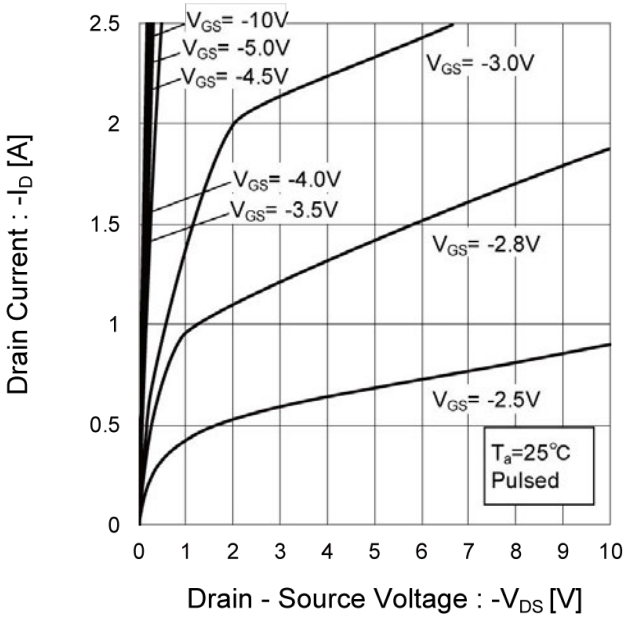
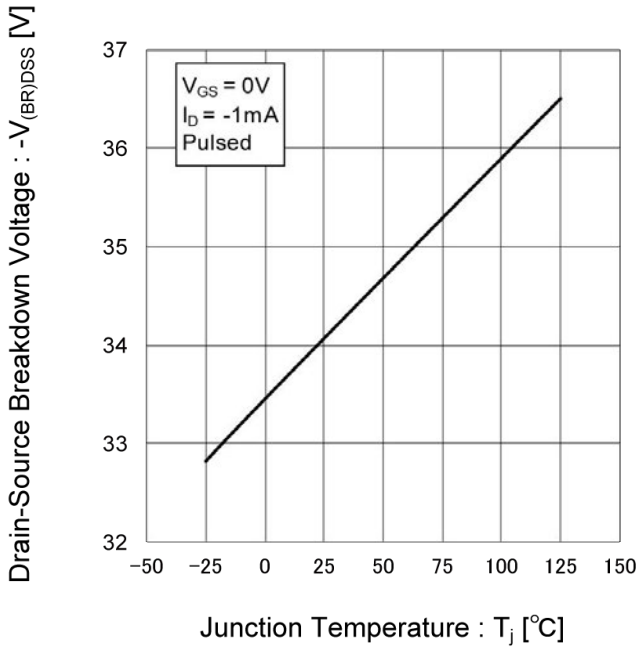


Fig.7 Breakdown Voltage vs. Junction Temperature



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●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

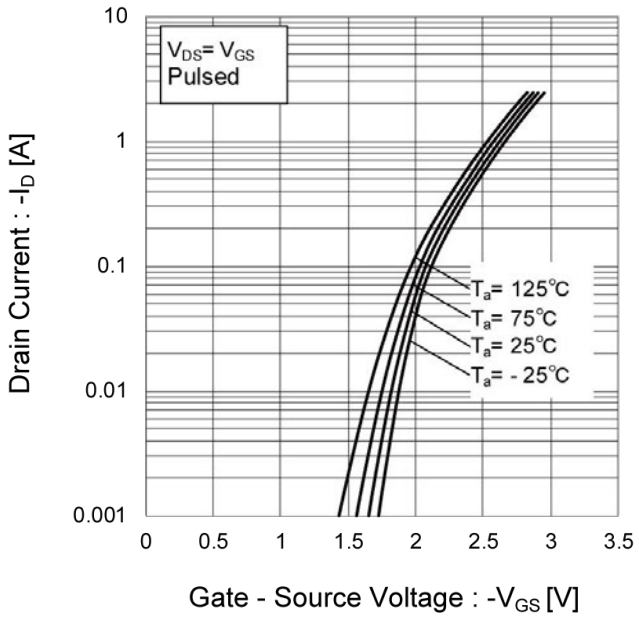


Fig.9 Gate Threshold Voltage vs. Junction Temperature

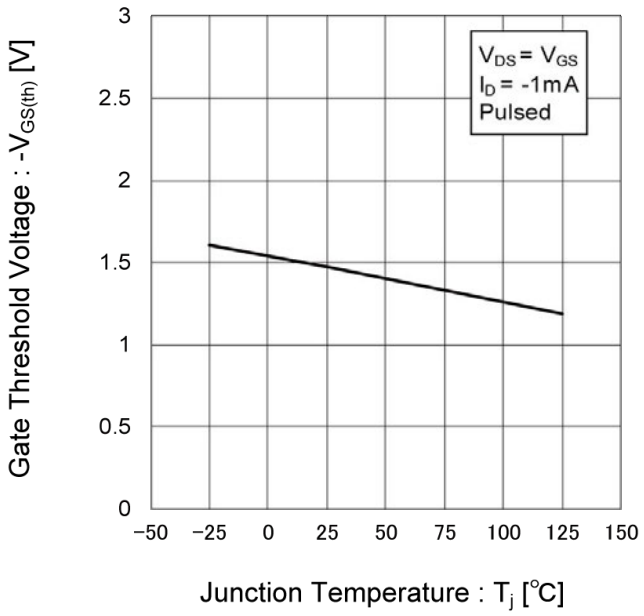
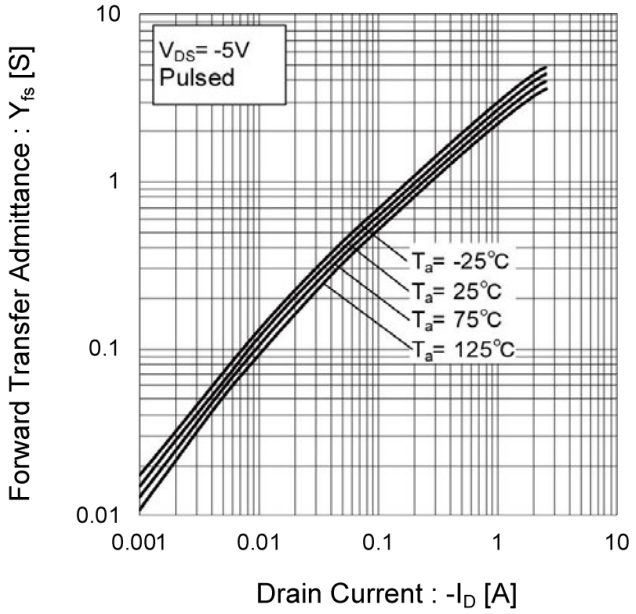


Fig.10 Transconductance vs. Drain Current



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Fig.11 Drain Current Derating Curve

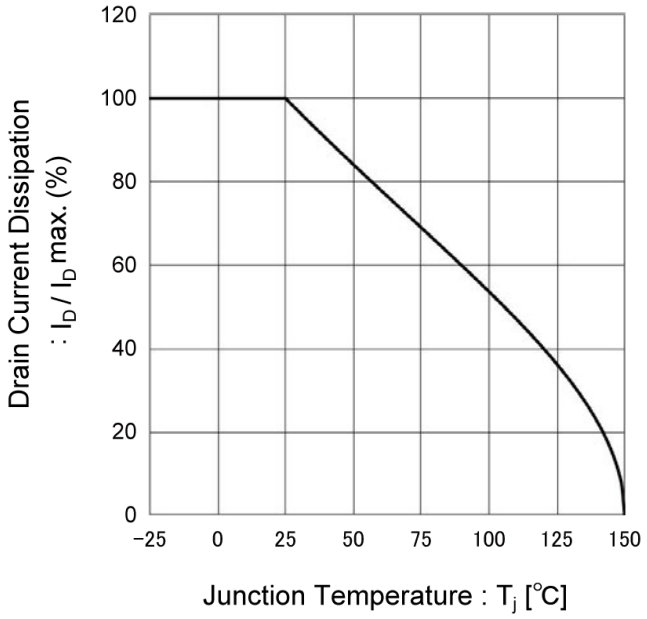


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

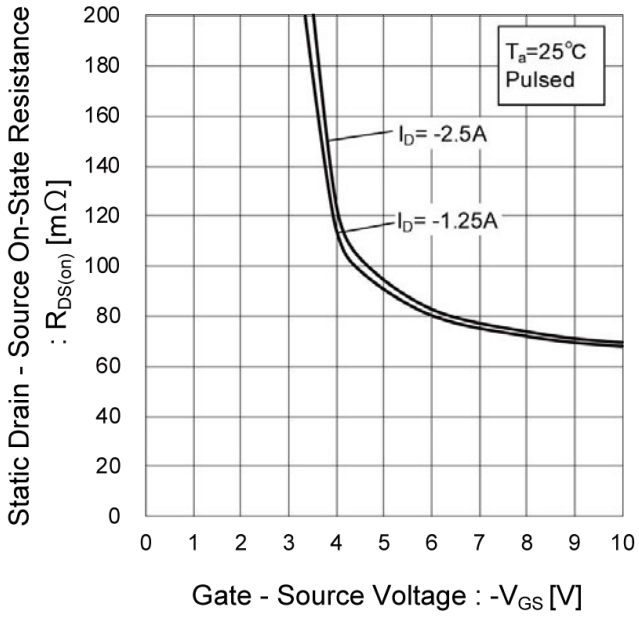
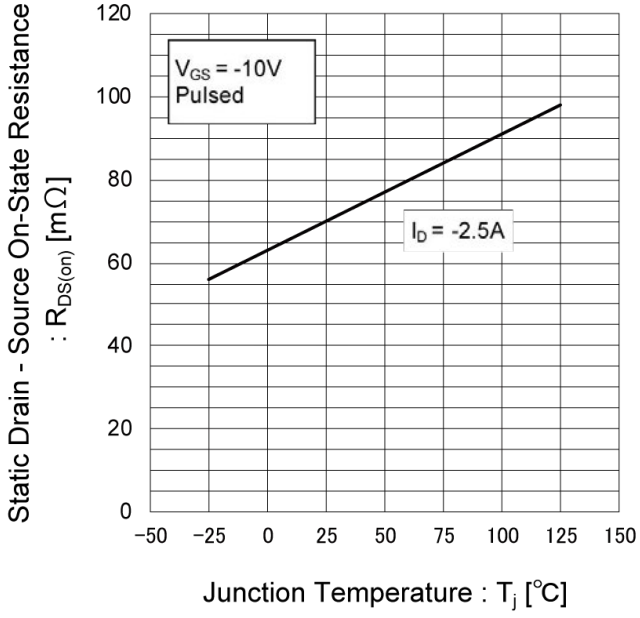


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



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●Electrical characteristic curves

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

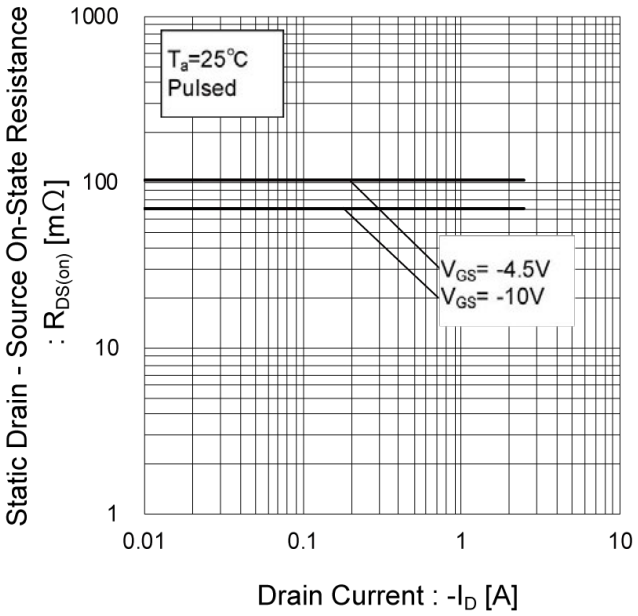


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

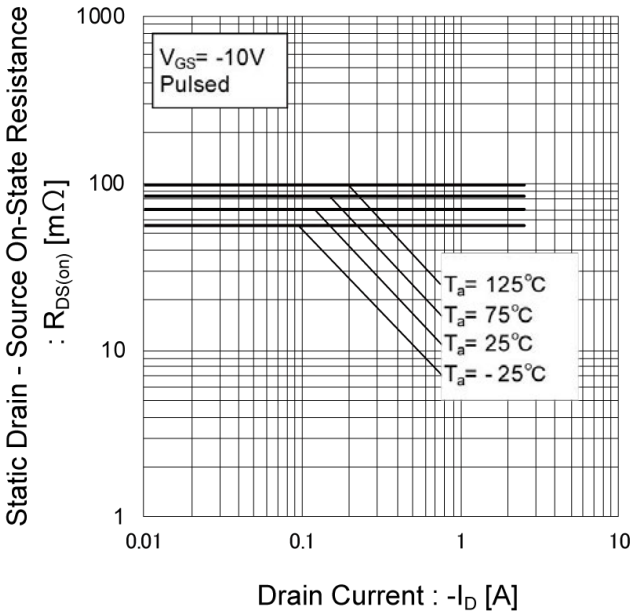
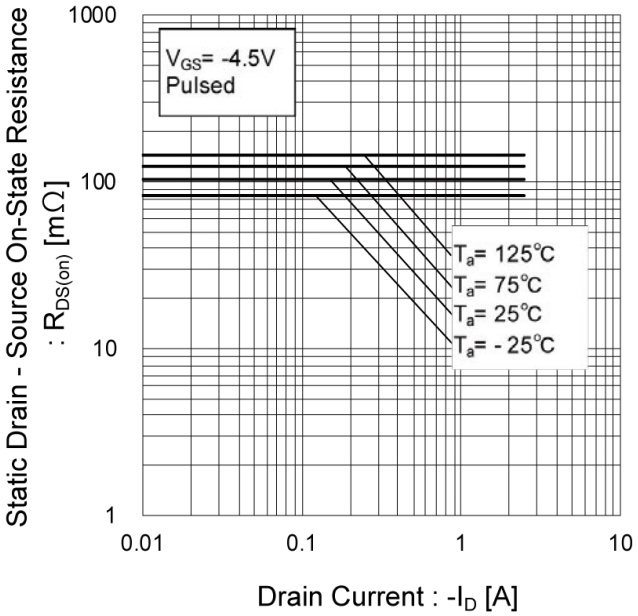


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



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●Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

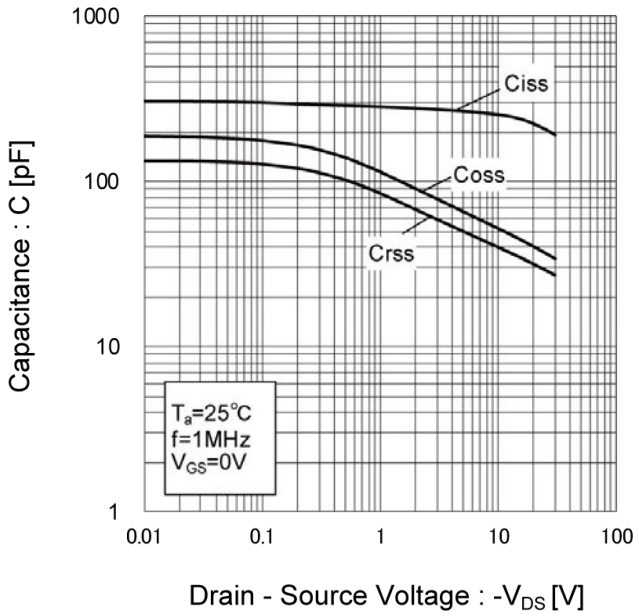


Fig.18 Switching Characteristics

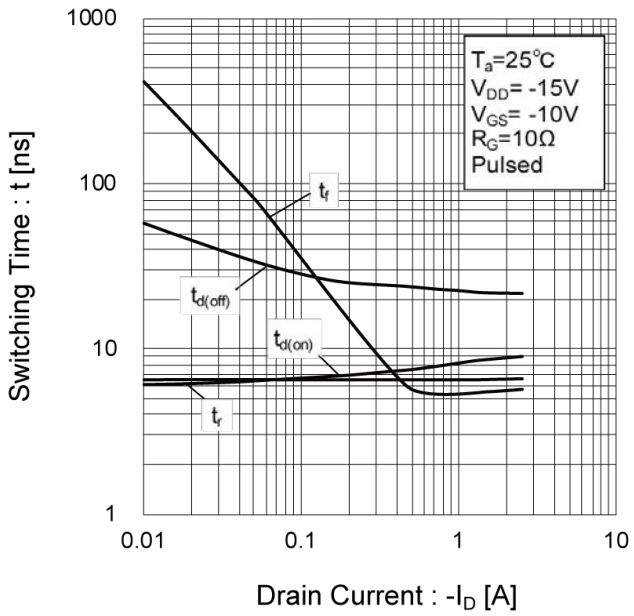


Fig.19 Dynamic Input Characteristics

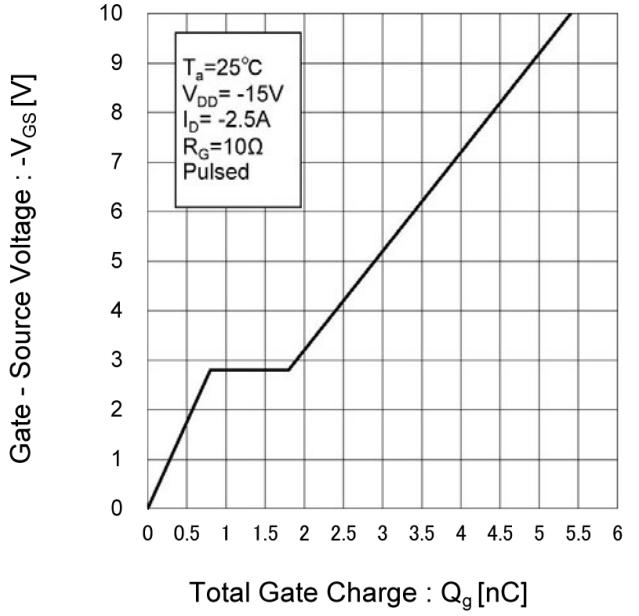
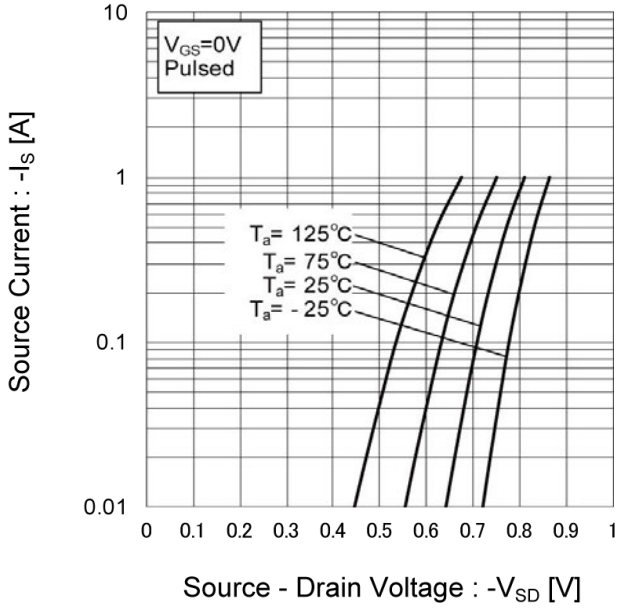


Fig.20 Source Current vs. Source Drain Voltage



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●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

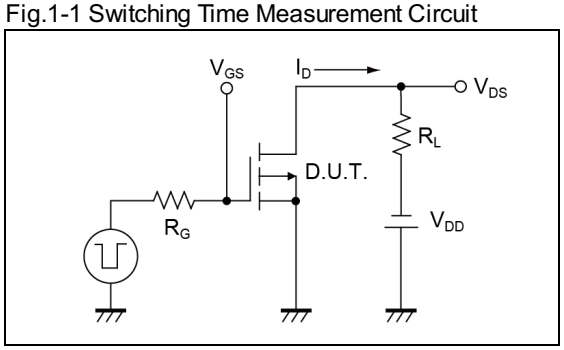


Fig.1-2 Switching Waveforms

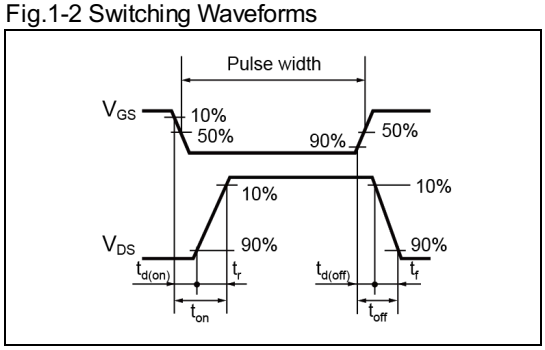


Fig.2-1 Gate Charge Measurement Circuit

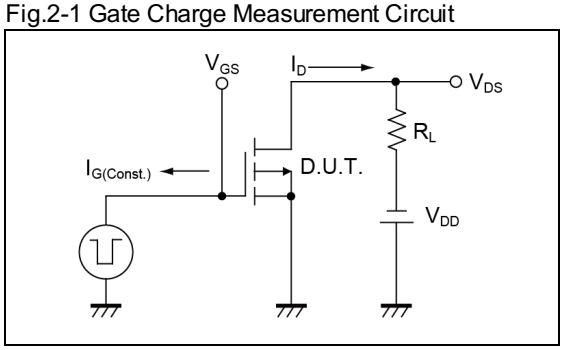


Fig.2-2 Gate Charge Waveform

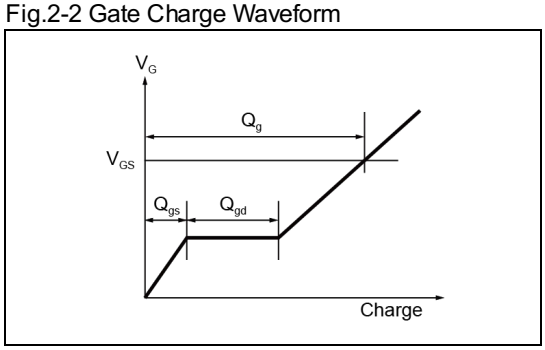


Fig.3-1 Avalanche Measurement Circuit

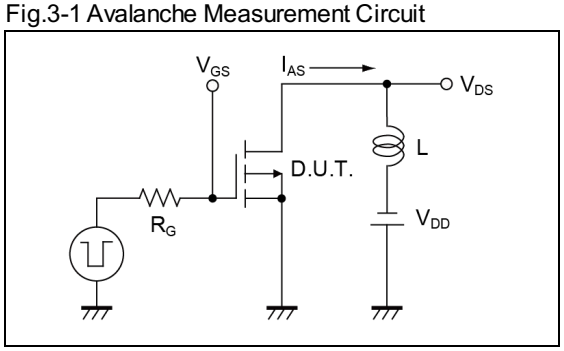
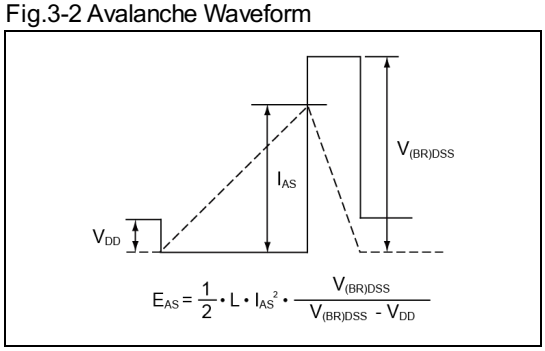


Fig.3-2 Avalanche Waveform

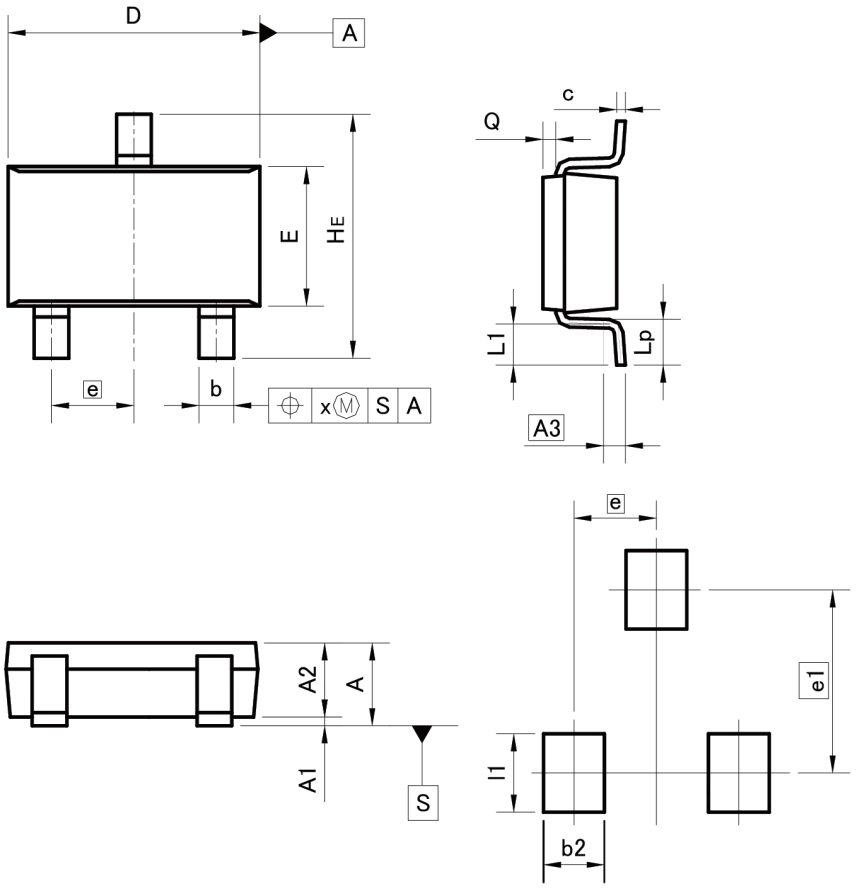


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●Dimensions

TSMT3



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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	–	1.00	–	0.039
A1	0.00	0.10	0.000	0.004
A2	0.75	0.95	0.030	0.037
A3	0.25		0.010	
b	0.35	0.50	0.014	0.020
c	0.10	0.26	0.004	0.010
D	2.80	3.00	0.110	0.118
E	1.50	1.80	0.059	0.071
e	0.95		0.037	
HE	2.60	3.00	0.102	0.118
L1	0.30	0.60	0.012	0.024
Lp	0.40	0.70	0.016	0.028
Q	0.05	0.25	0.002	0.010
x	–	0.20	–	0.008

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2		0.70	–	0.028
e1	2.10		0.083	
l1	–	0.90	–	0.035

Dimension in mm/inches

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