R5207AND

Nch 525V 7A Power MOSFET

Datasheet

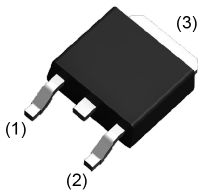
V_{DSS}	525V
$R_{DS(on)}$(Max.)	1.0Ω
I_D	±7A
P_D	40W

●Outline

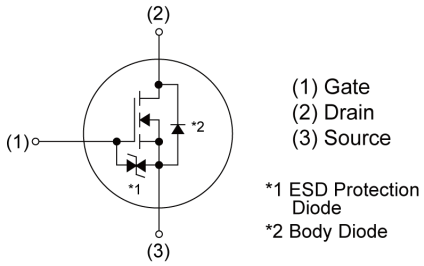
CPT3

SC-63

TO-252



●Inner circuit



●Features

1) Low on-resistance.
2) Fast switching speed.
3) Gate-source voltage (V_{GSS}) guaranteed to be ±30V.
4) Drive circuits can be simple.
5) Parallel use is easy.
6) Pb-free lead plating ; RoHS compliant

●Application

Switching Power Supply

●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	330
	Tape width (mm)	16
	Basic ordering unit (pcs)	2500
	Taping code	TL
	Marking	R5207A

●Absolute maximum ratings (T_a = 25°C)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	525	V
Continuous drain current	T_C = 25°C	I_D *1	±7	A
	T_C = 100°C	I_D *1	±3.4	A
Pulsed drain current		$I_{D,pulse}$ *2	±28	A
Gate - Source voltage		V_{GSS}	±30	V
Avalanche energy, single pulse		E_{AS} *3	3.2	mJ
Avalanche energy, repetitive		E_{AR} *4	2.5	mJ
Avalanche current		I_{AR} *3	3.5	A
Power dissipation (T_c = 25°C)		P_D	40	W
Junction temperature		T_j	150	℃
Range of storage temperature		T_{stg}	-55 to +150	℃
Reverse diode dv/dt		dv/dt	15	V/ns

●Absolute maximum ratings

Parameter	Symbol	Conditions	Values	Unit
Drain - Source voltage slope	dv/dt	V_{DS} = 400V, I_D = 7A T_j = 125℃	50	V/ns

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	R_{thJC}	-	-	3.13	℃/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	100	℃/W
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	℃

●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	525	-	-	V
Drain - Source avalanche breakdown voltage	$V_{(BR)DS}$	V_{GS} = 0V, I_D = 3.5A	-	580	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 525V, V_{GS} = 0V T_j = 25°C T_j = 125°C	- -	0.1 -	100 1000	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = 10V, I_D = 1mA	2.5	-	4.5	V
Static drain - source on - state resistance	$R_{DS(on)}$ *6	V_{GS} = 10V, I_D = 3.5A T_j = 25°C T_j = 125°C	- -	0.78 1.7	1.0 -	Ω
Gate input resistance	R_G	f = 1MHz, open drain	-	9	-	Ω

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs} *6	V_{DS} = 10V, I_D = 3.5A	2.5	4.3	-	S
Input capacitance	C_{iss}	V_{GS} = 0V	-	500	-	pF
Output capacitance	C_{oss}	V_{DS} = 25V	-	300	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	23	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS} = 0V, V_{DS} = 0V to 400V	-	68.2	-	pF
Effective output capacitance, time related	$C_{o(tr)}$		-	61.4	-	
Turn - on delay time	$t_{d(on)}$ *6	V_{DD} ≃ 250V, V_{GS} = 10V	-	20	-	ns
Rise time	t_r *6	I_D = 3.5A	-	22	-	
Turn - off delay time	$t_{d(off)}$ *6	R_L ≃ 71.4Ω	-	50	100	
Fall time	t_f *6	R_G = 10Ω	-	25	50	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *6	V_{DD} ≃ 250V	-	13	-	nC
Gate - Source charge	Q_{gs} *6	I_D = 7A	-	3.5	-	
Gate - Drain charge	Q_{gd} *6	V_{GS} = 10V	-	5.5	-	
Gate plateau voltage	$V_{(plateau)}$	V_{DD} ≃ 250V, I_D = 7A	-	4.1	-	V

*1 Limited only by maximum temperature allowed.

*2 Pw ≤ 10μs, Duty cycle ≤ 1%

*3 L≃500μH, V_{DD}=50V, R_G=25Ω, starting T_j=25°C

*4 L≃500μH, V_{DD}=50V, R_G=25Ω, starting T_j=25°C, f=10kHz

*5 Reference measurement circuits Fig.5-1.

*6 Pulsed

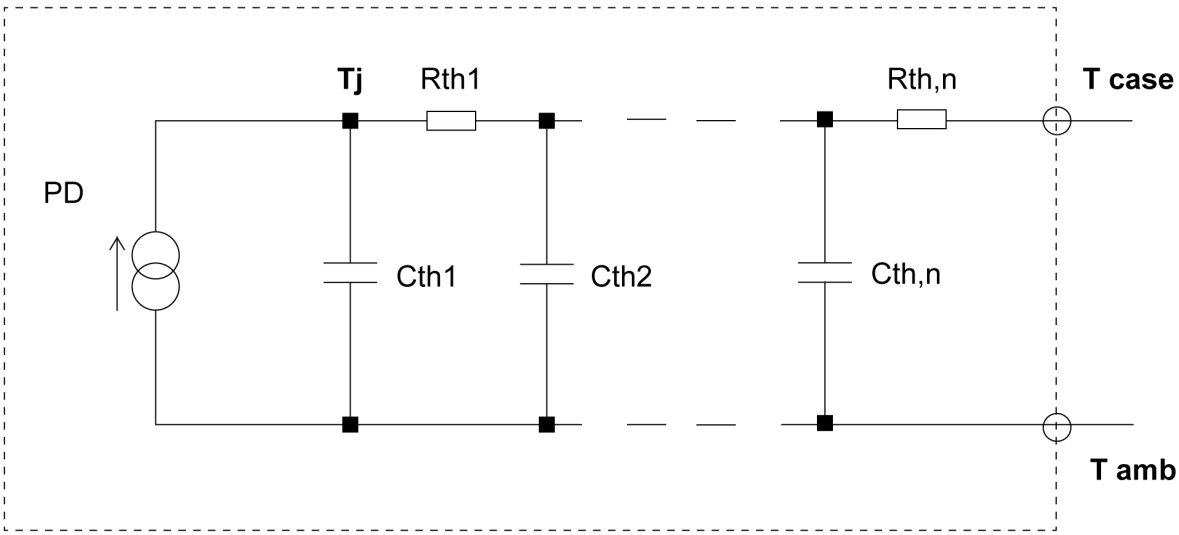
●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	T_C = 25℃	-	-	7	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	28	A
Forward voltage	V_{SD} *6	V_{GS} = 0V, I_S = 7A	-	-	1.5	V
Reverse recovery time	t_{rr} *6	I_S = 7A di/dt = 100A/μs	-	300	-	ns
Reverse recovery charge	Q_{rr} *6		-	1.73	-	μC
Peak reverse recovery current	I_{rrm} *6		-	11.5	-	A

●Typical transient thermal characteristics

Symbol	Value	Unit
R_{th1}	1.08	K/W
R_{th2}	2.21	
R_{th3}	21.4	
R_{th4}	43	

Symbol	Value	Unit
C_{th1}	0.00236	Ws/K
C_{th2}	0.0126	
C_{th3}	0.153	
C_{th4}	1.25	



●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

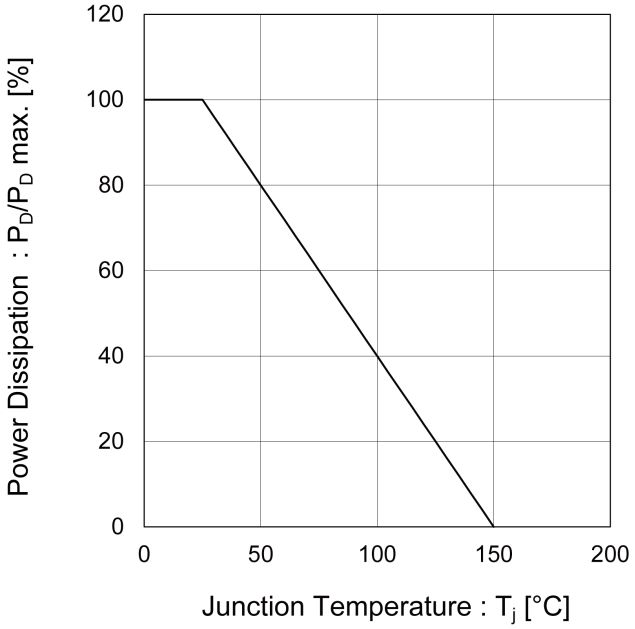


Fig.2 Maximum Safe Operating Area

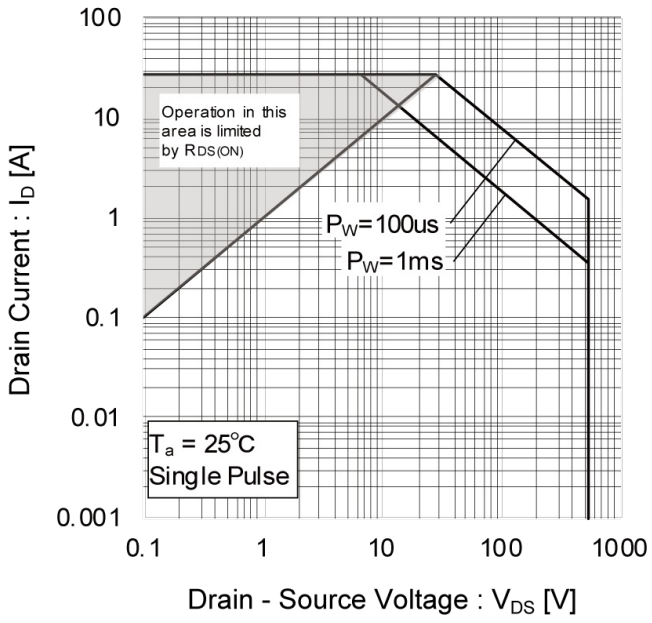
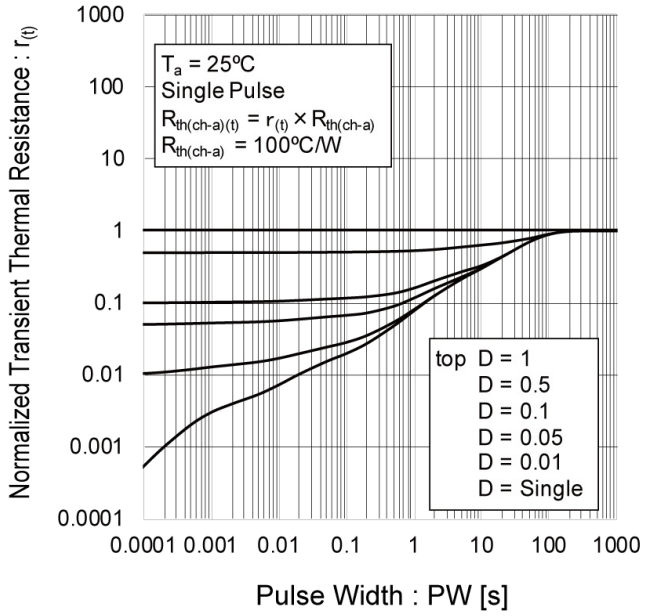


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Avalanche Current vs. Inductive Load

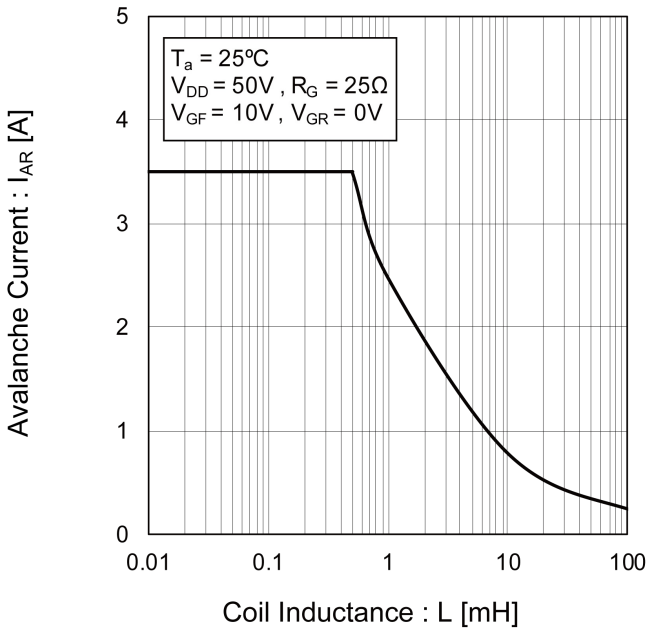


Fig.5 Avalanche Power Losses

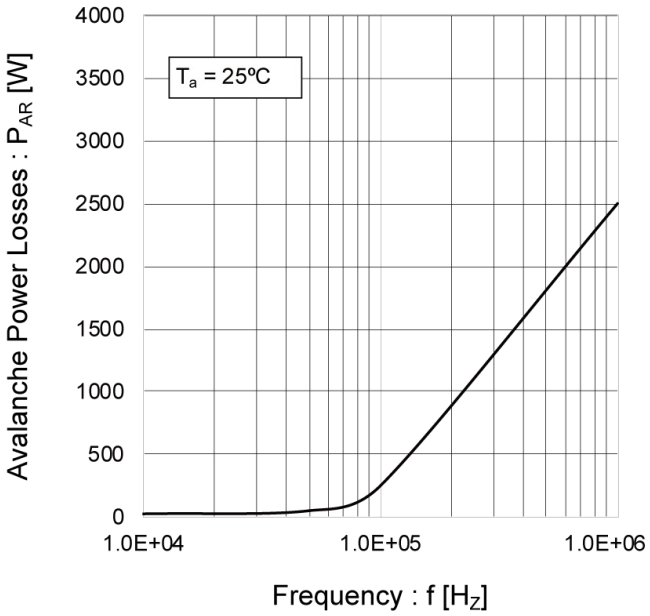
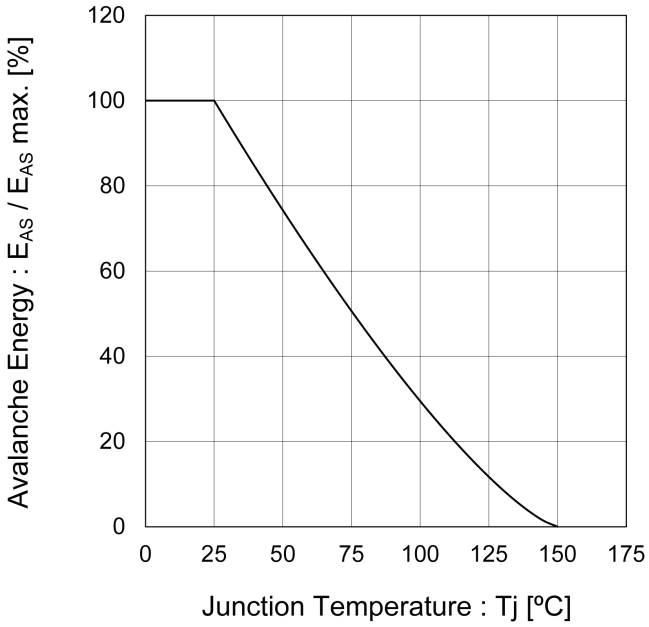


Fig.6 Avalanche Energy Derating Curve vs. Junction Temperature



●Electrical characteristic curves

Fig.7 Typical Output Characteristics(I)

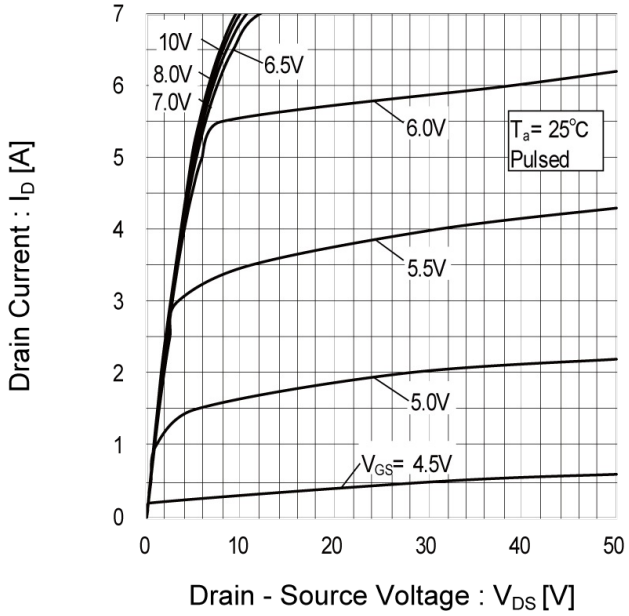


Fig.8 Typical Output Characteristics(II)

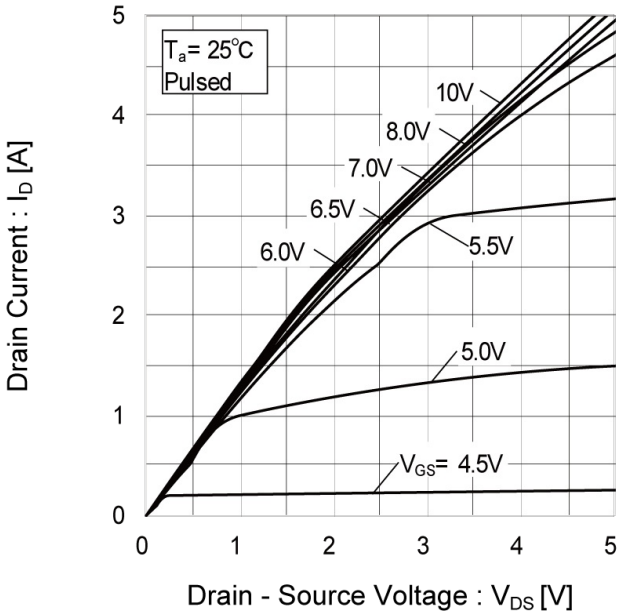


Fig.9 Tj = 150°C Typical Output Characteristics (I)

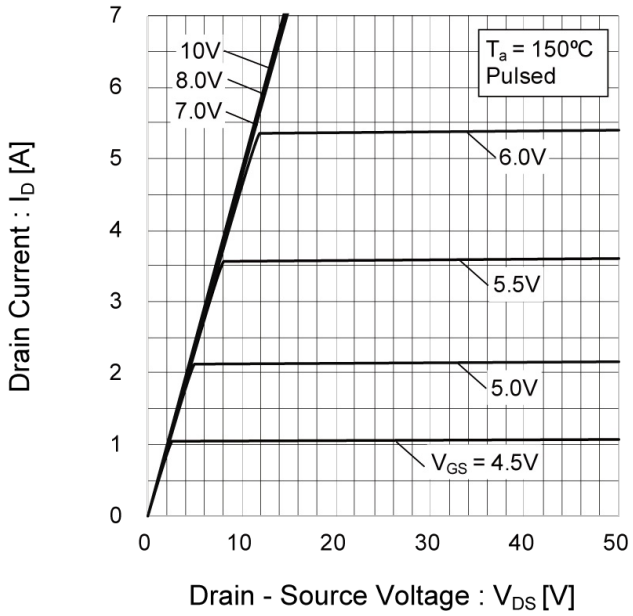
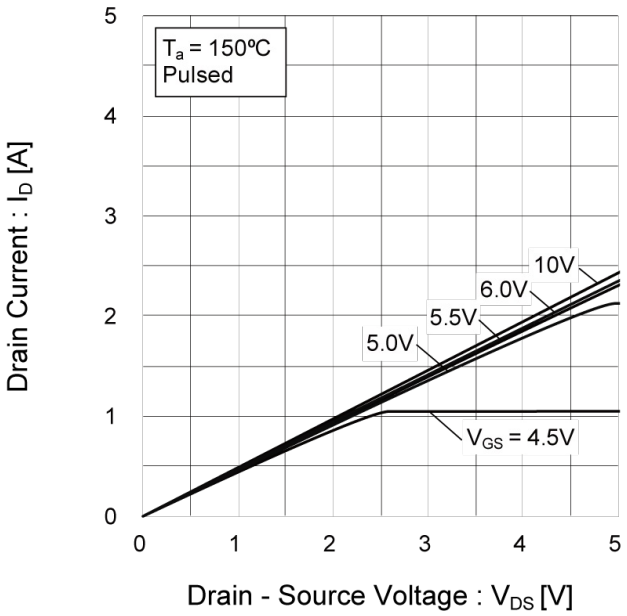


Fig.10 Tj = 150°C Typical Output Characteristics (II)



●Electrical characteristic curves

Fig.11 Breakdown Voltage vs. Junction Temperature

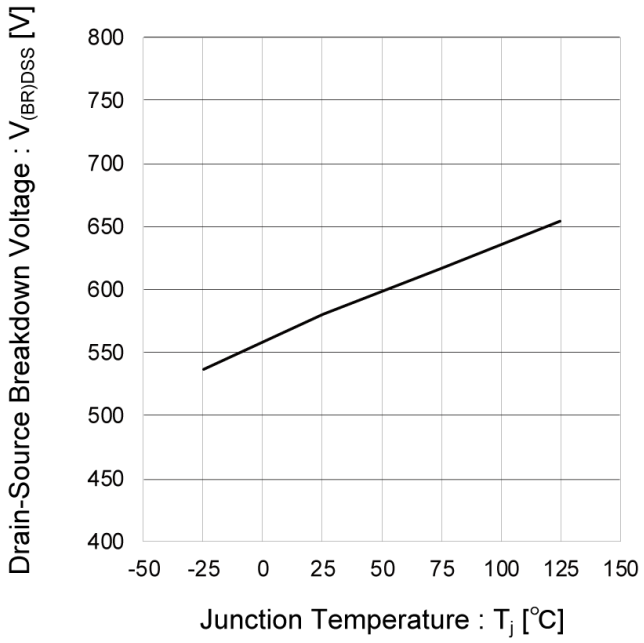


Fig.12 Typical Transfer Characteristics

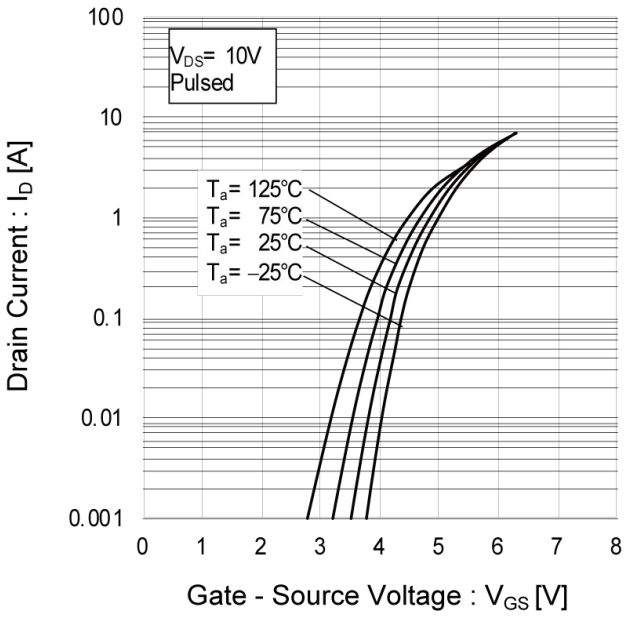


Fig.13 Gate Threshold Voltage vs. Junction Temperature

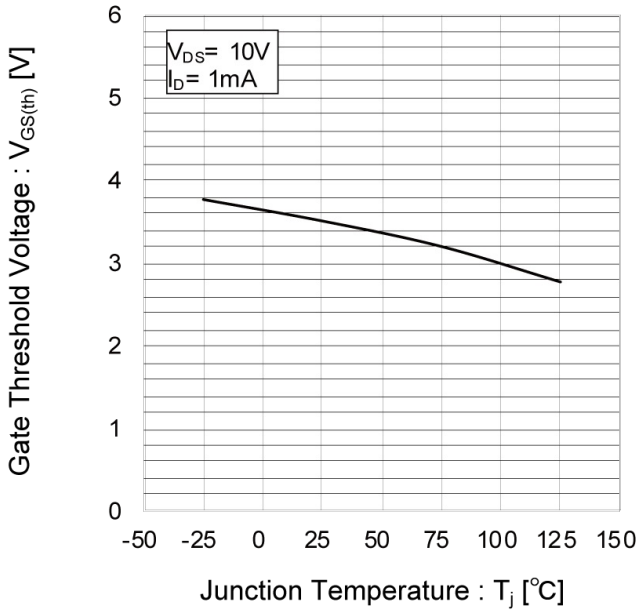
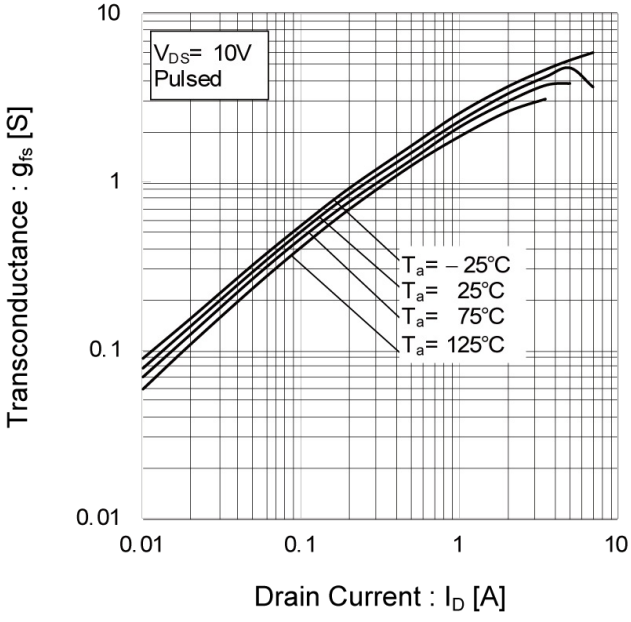


Fig.14 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.15 Static Drain - Source On - State Resistance vs. Gate Source Voltage

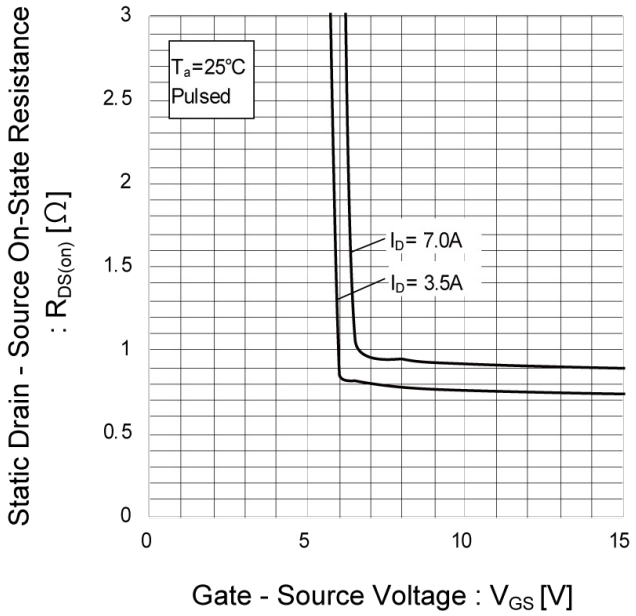


Fig.16 Static Drain - Source On - State Resistance vs. Junction Temperature

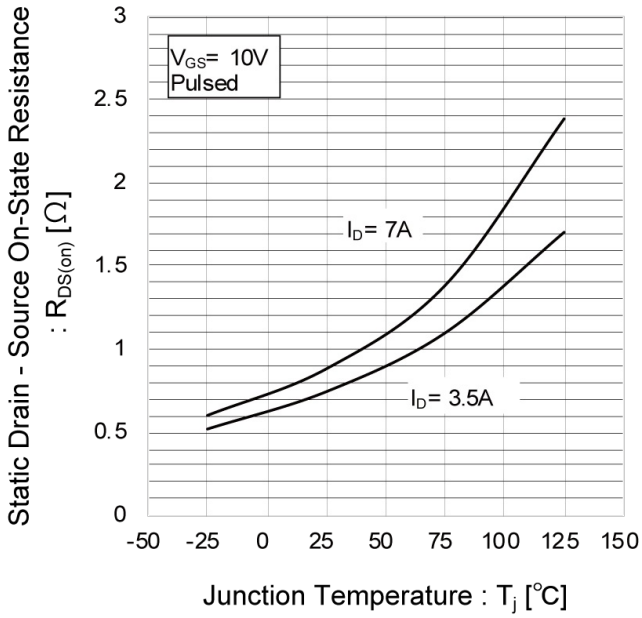
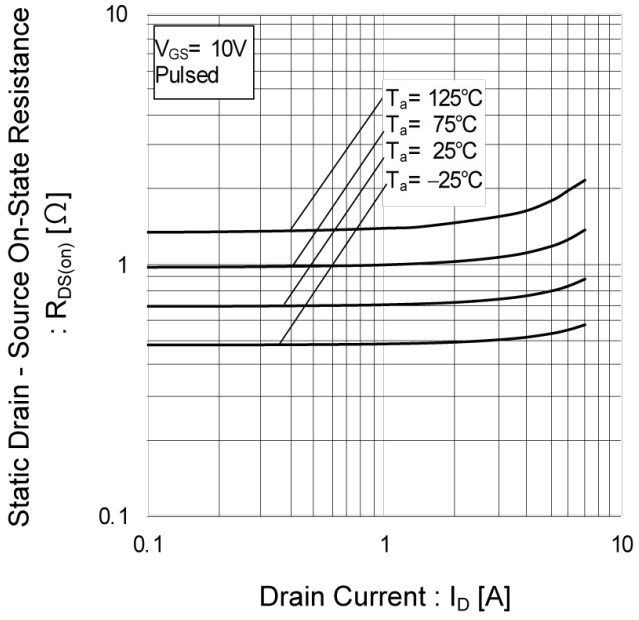


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.18 Typical Capacitance vs. Drain - Source Voltage

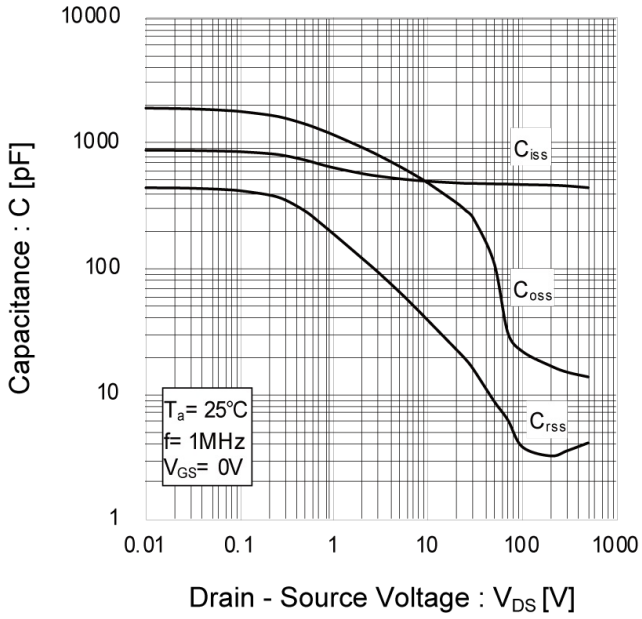


Fig.19 Coss Stored Energy

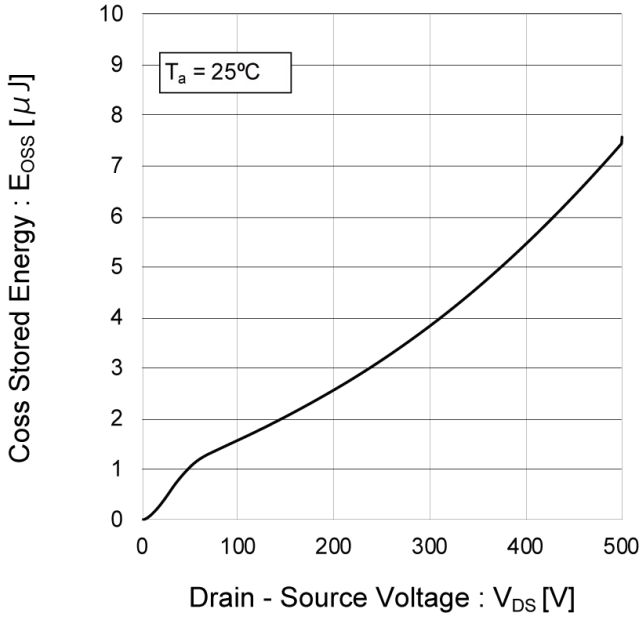


Fig.20 Switching Characteristics

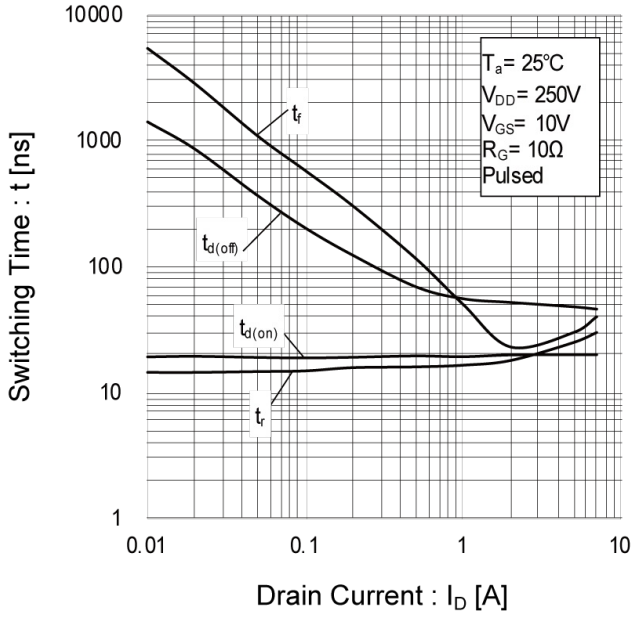
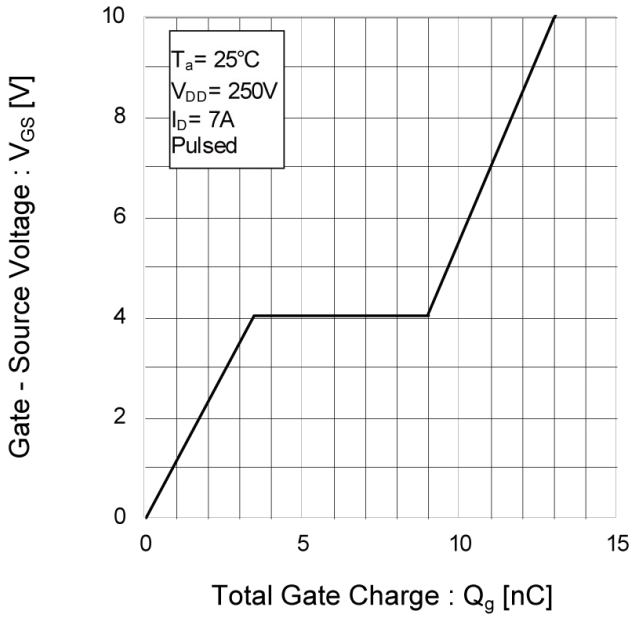


Fig.21 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.22 Inverse Diode Forward Current vs. Source - Drain Voltage

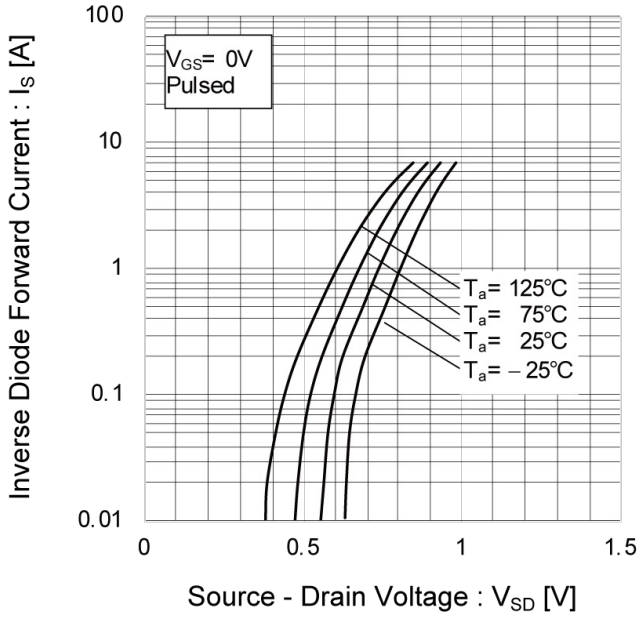
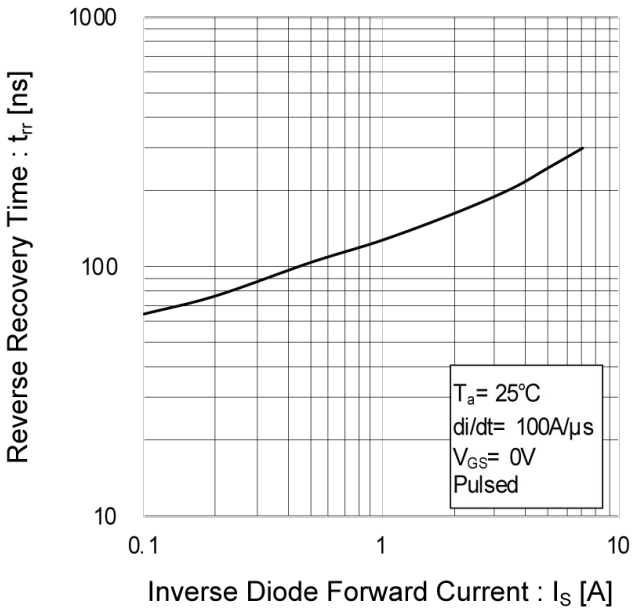


Fig.23 Reverse Recovery Time vs. Inverse Diode Forward Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

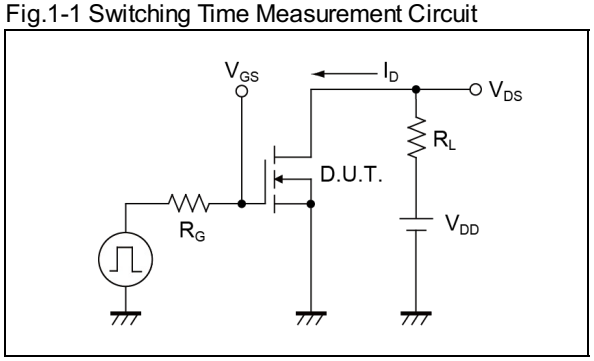


Fig.1-2 Switching Waveforms

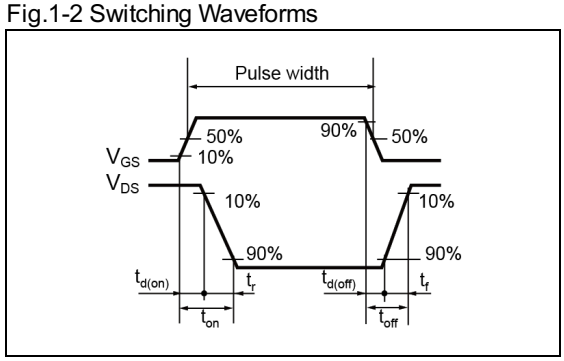


Fig.2-1 Gate Charge Measurement Circuit

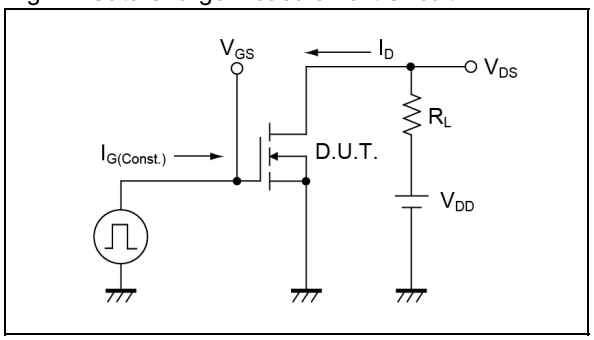


Fig.2-2 Gate Charge Waveform

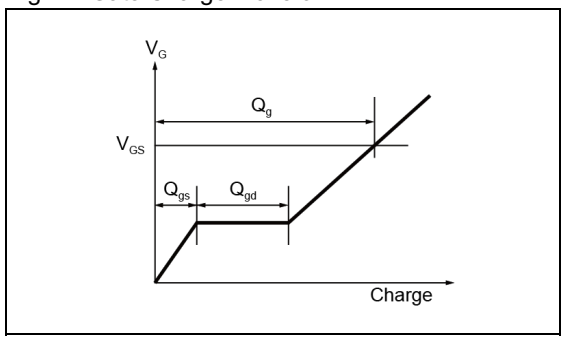


Fig.3-1 Avalanche Measurement Circuit

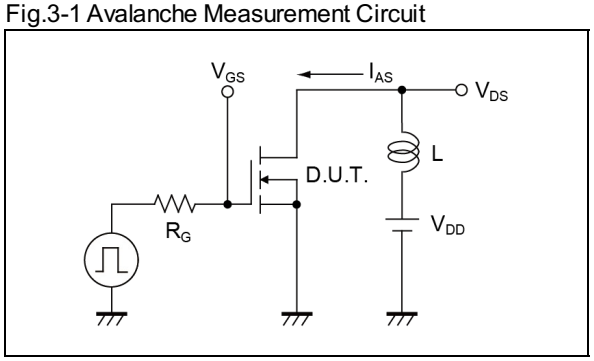


Fig.3-2 Avalanche Waveform

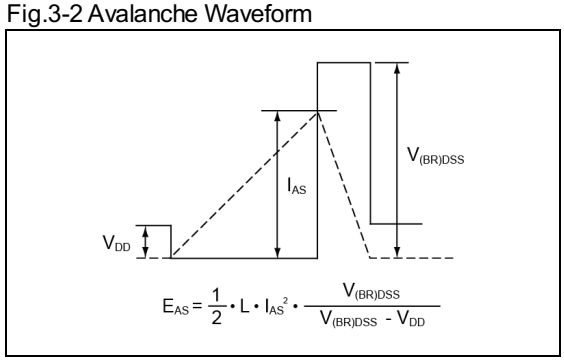


Fig.4-1 dv/dt Measurement Circuit

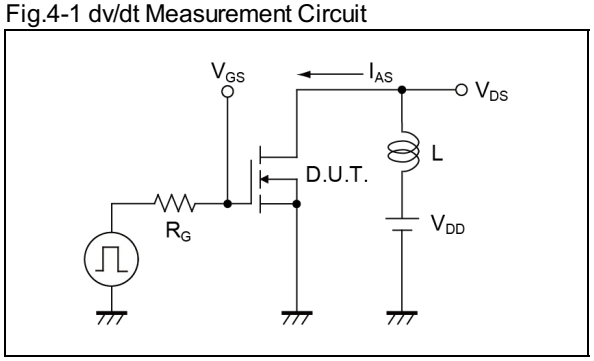


Fig.4-2 dv/dt Waveform

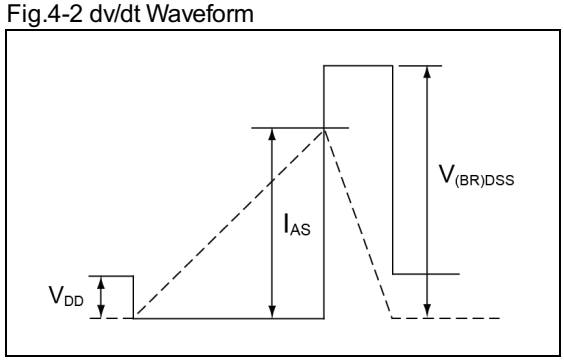


Fig.5-1 di/dt Measurement Circuit

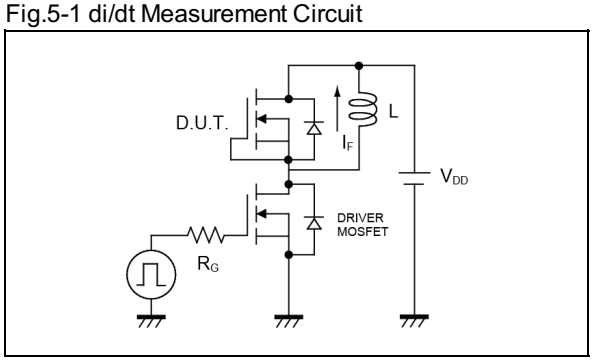
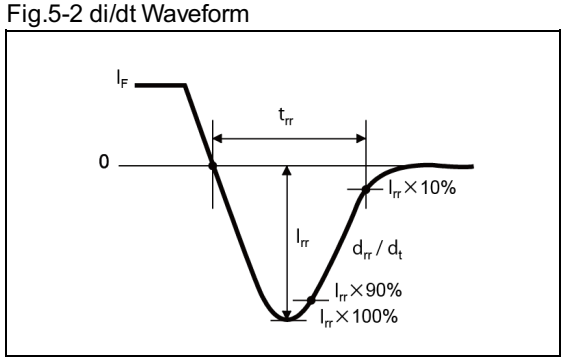


Fig.5-2 di/dt Waveform

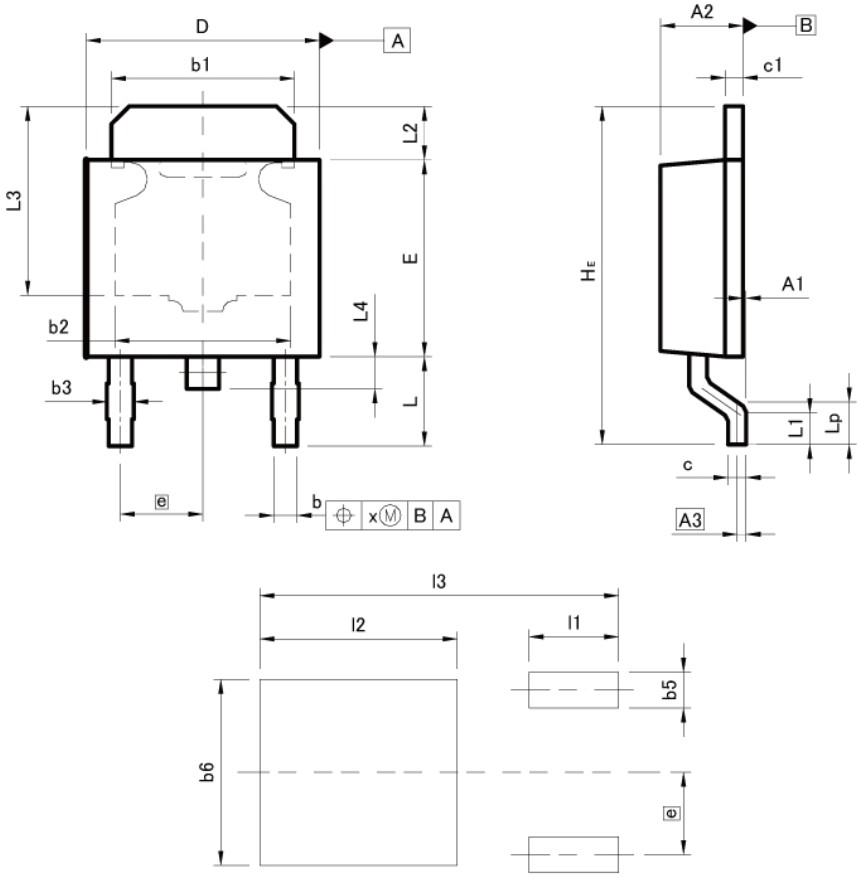


●Dimensions

CPT

< TO-252 >

(DPAK)



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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A1	0.00	0.15	0.000	0.006
A2	2.20	2.50	0.087	0.098
A3	0.25		0.010	
b	0.55	0.75	0.022	0.030
b1	5.00	5.30	0.197	0.209
b2	5.00		0.197	
b3	0.75		0.030	
c	0.40	0.60	0.016	0.024
c1	0.40	0.60	0.016	0.024
D	6.30	6.70	0.248	0.264
E	5.40	5.80	0.213	0.228
e	2.30		0.091	
HE	9.00	10.00	0.354	0.394
L	2.20	2.80	0.087	0.110
L1	0.80	1.40	0.031	0.055
L2	1.20	1.80	0.047	0.071
L3	5.30		0.209	
L4	0.90		0.035	
Lp	1.00	1.60	0.039	0.063
x	–	0.25	–	0.010

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b5	–	1.00	–	0.04
b6	–	5.20	–	0.205
l1	–	2.50	–	0.098
l2	–	5.50	–	0.217
l3	–	10.00	–	0.394

Dimension in mm/inches

Notes

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