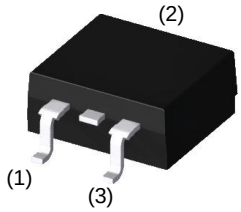
RCJ160N20

Nch 200V 16A Power MOSFET Datasheet

V_{DSS}	200V
$R_{DS(on)}$ (Max.)	180mΩ
I_D	±16A
P_D	40W

●Outline

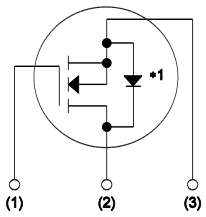
LPT(S)
(SC-83)



●Features

1) Low on-resistance.
2) Fast switching speed.
3) Drive circuits can be simple.
4) Parallel use is easy.
5) Pb-free lead plating ; RoHS compliant
6) 100% Avalanche tested

●Inner circuit



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

∗1 BODY DIODE

●Application

Switching Power Supply
Automotive Motor Drive
Automotive Solenoid Drive

●Packaging specifications

Type	Packaging	Taping
	Reel size (mm)	330
	Tape width (mm)	24
	Basic ordering unit (pcs)	1,000
	Taping code	TL
	Marking	RCJ160N20

●Absolute maximum ratings(T_a = 25°C)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	200	V
Continuous drain current	T_c = 25°C	I_D *1	±16	A
	T_c = 100°C	I_D *1	±8.7	A
Pulsed drain current		$I_{D,pulse}$ *2	±64	A
Gate - Source voltage		V_{GSS}	±30	V
Avalanche energy, single pulse		E_{AS} *3	20.7	mJ
Avalanche current		I_{AR} *3	8.0	A
Power dissipation	T_c = 25°C	P_D	40	W
	T_a = 25°C *4	P_D	1.56	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 - case	R_{thJC}	-	-	3.13	°C/W
Thermal resistance, junction - ambient *4	R_{thJA}	-	-	80	°C/W
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	°C

●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	200	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 200V, V_{GS} = 0V T_j = 25°C	-	-	10	μA
		V_{DS} = 200V, V_{GS} = 0V T_j = 125°C	-	-	100	
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	3.25	-	5.25	V
Static drain - source on - state resistance	$R_{DS(on)}$ *5	V_{GS} = 10V, I_D = 8.0A	-	135	180	mΩ
		V_{GS} = 10V, I_D = 8.0A T_j = 125°C	-	295	410	
Forward transfer admittance	g_{fs}	V_{DS} = 10V, I_D = 8.0A	4	8	-	S

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	1370	-	pF
Output capacitance	C_{oss}	V_{DS} = 25V	-	95	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	50	-	
Turn - on delay time	$t_{d(on)}$ *5	V_{DD} ≃ 100V, V_{GS} = 10V	-	27	-	ns
Rise time	t_r *5	I_D = 8.0A	-	47	-	
Turn - off delay time	$t_{d(off)}$ *5	R_L = 12.5Ω	-	42	-	
Fall time	t_f *5	R_G = 10Ω	-	17	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *5	V_{DD} ≃ 100V	-	26	-	nC
Gate - Source charge	Q_{gs} *5	I_D = 16A	-	10	-	
Gate - Drain charge	Q_{gd} *5	V_{GS} = 10V	-	11	-	
Gate plateau voltage	$V_{(plateau)}$	V_{DD} ≃ 100V, I_D = 16A	-	7.0	-	V

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous source current	I_S *1	T_c = 25°C	-	-	16	A
Pulsed source current	I_{SM} *2		-	-	64	A
Forward voltage	V_{SD} *5	V_{GS} = 0V, I_S = 16A	-	-	1.5	V
Reverse recovery time	t_{rr} *5	I_S = 8.0A di/dt = 100A/μs	-	85	-	ns
Reverse recovery charge	Q_{rr} *5		-	300	-	nC

*1 Limited only by maximum temperature allowed.

*2 Pw ≤ 10μs, Duty cycle ≤ 1%

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

*4 Mounted on a epoxy PCB FR4 (25mm × 27mm × 0.8mm)

*5 Pulsed

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

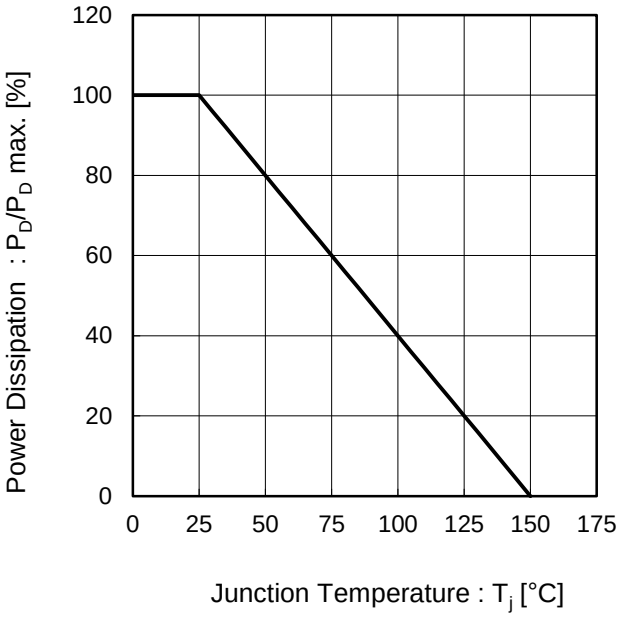


Fig.2 Maximum Safe Operating Area

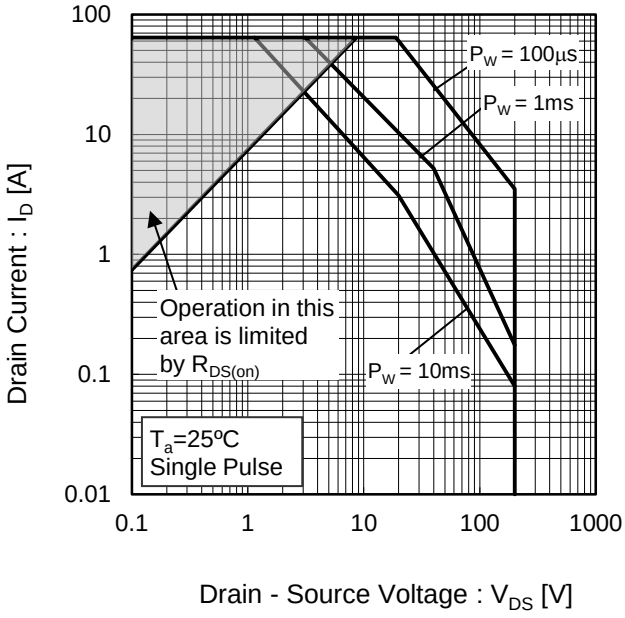
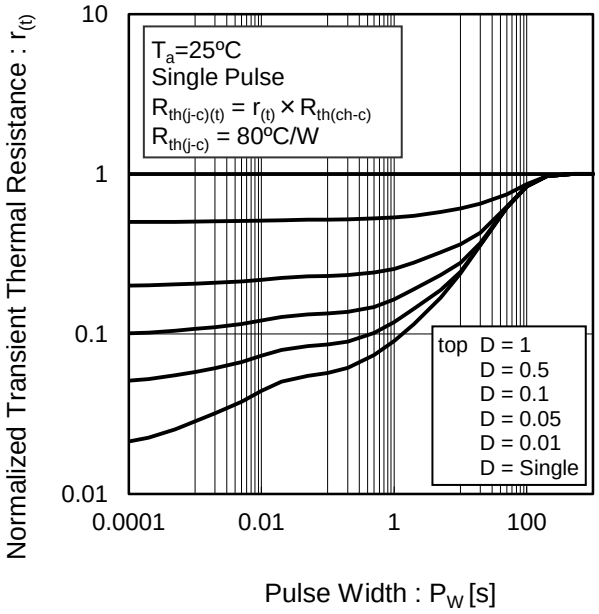


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Avalanche Current vs Inductive Load

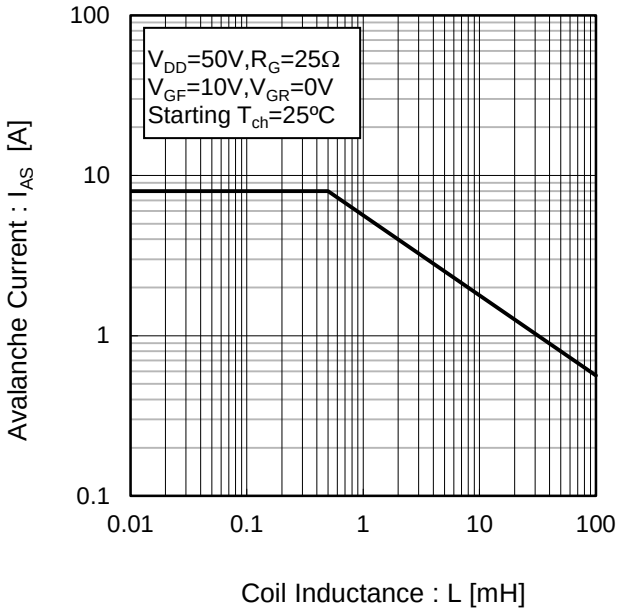


Fig.5 Avalanche Energy Derating Curve vs Junction Temperature

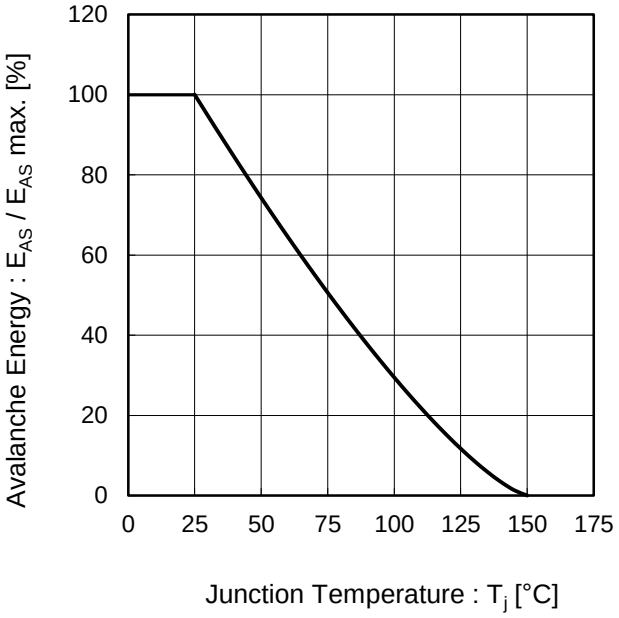


Fig.6 Typical Output Characteristics(I)

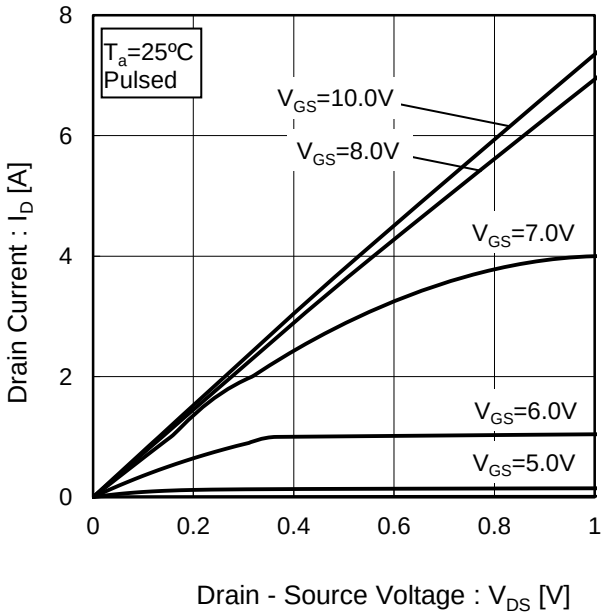
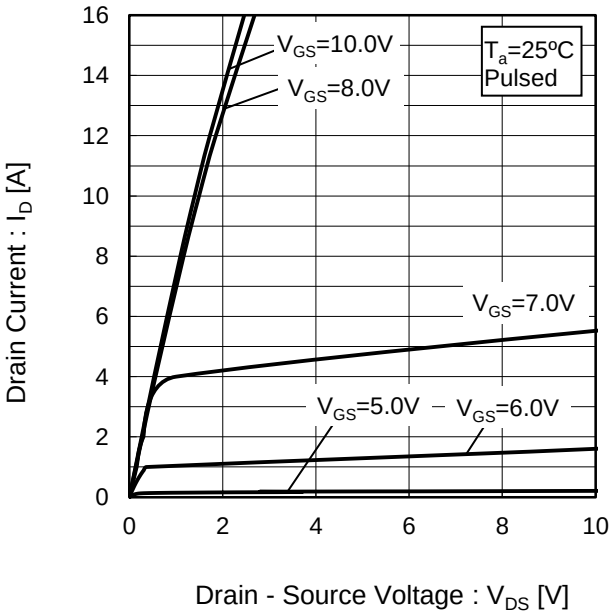


Fig.7 Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Breakdown Voltage vs. Junction Temperature

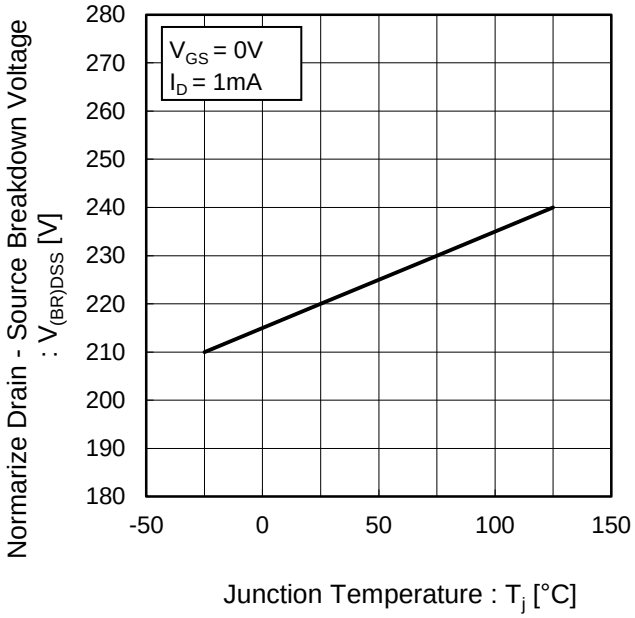


Fig.9 Typical Transfer Characteristics

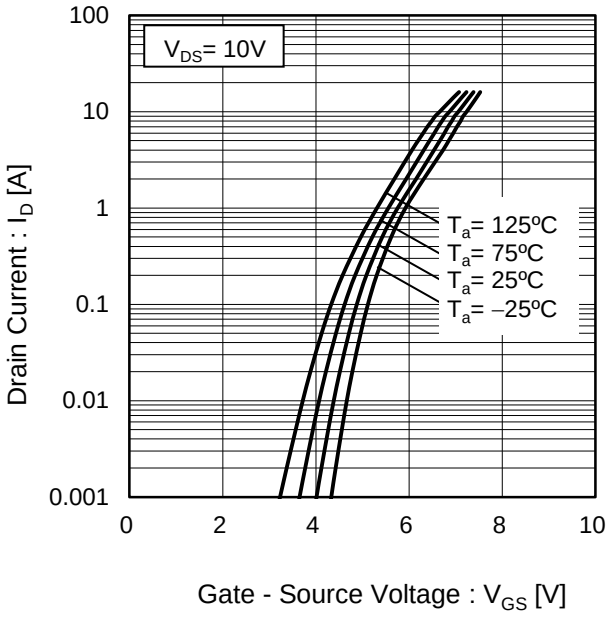


Fig.10 Gate Threshold Voltage vs. Junction Temperature

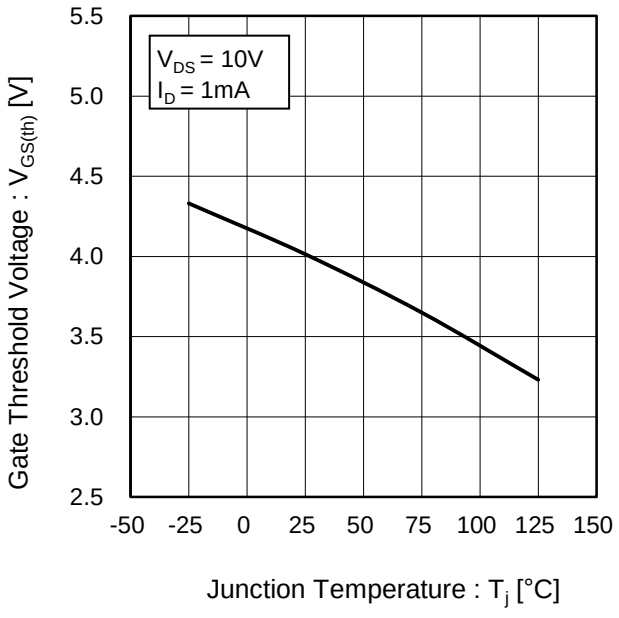
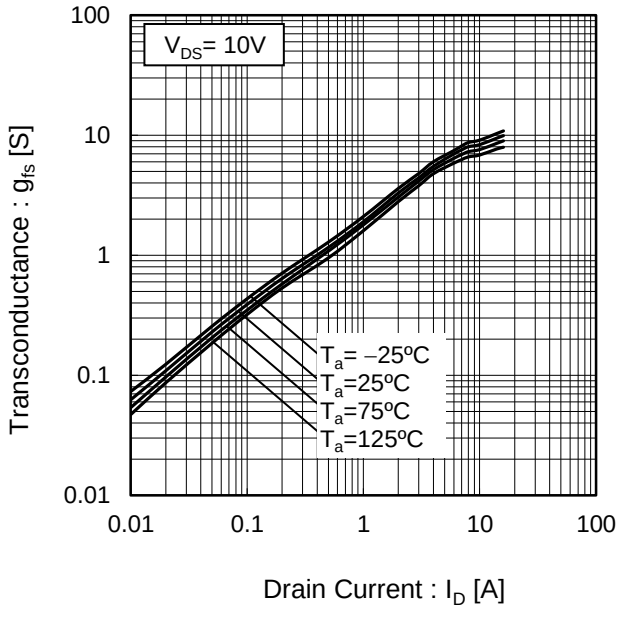


Fig.11 Transconductance vs. Drain Current



●Electrical characteristic curves

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

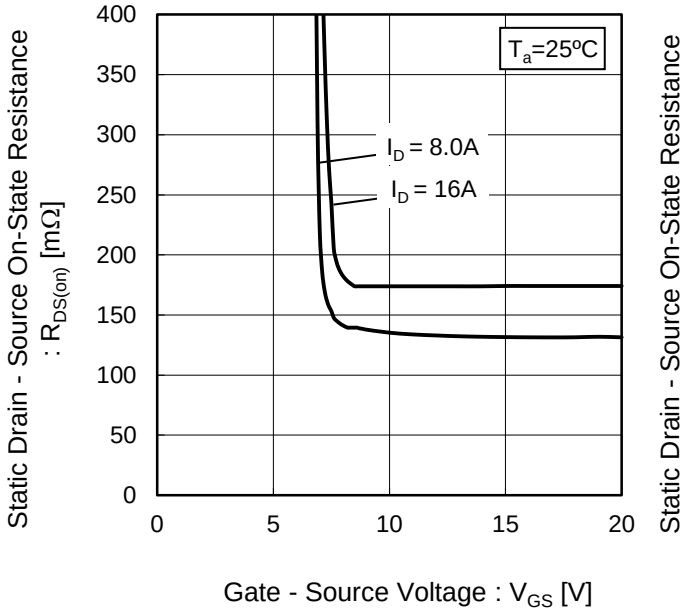


Fig.13 Static Drain - Source On - State Resistance vs. Drain Current(I)

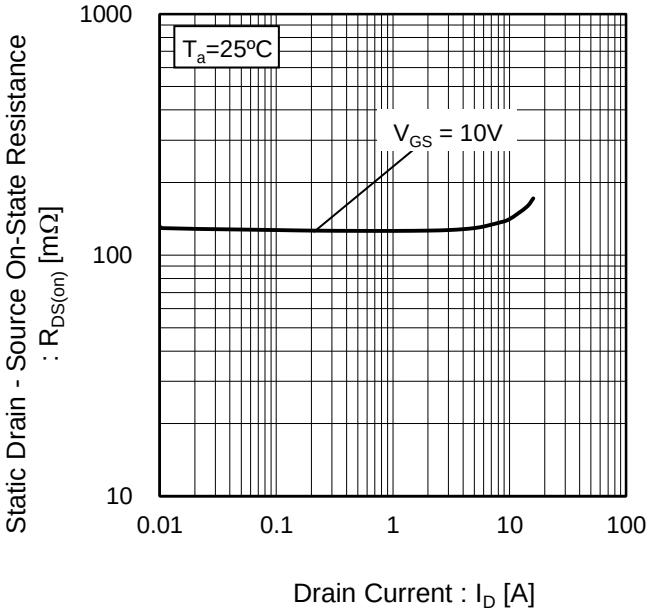
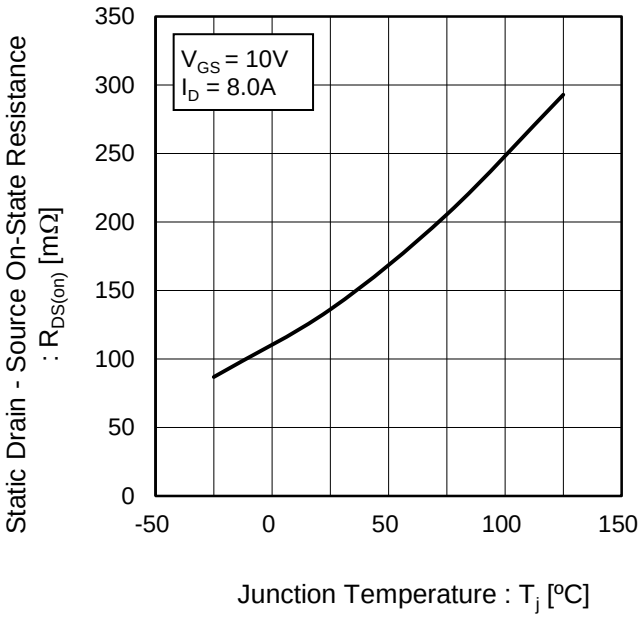


Fig.14 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

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

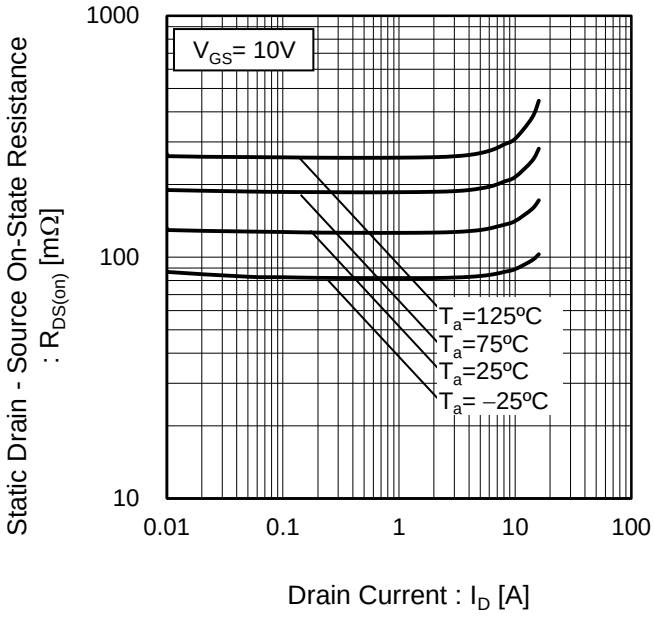
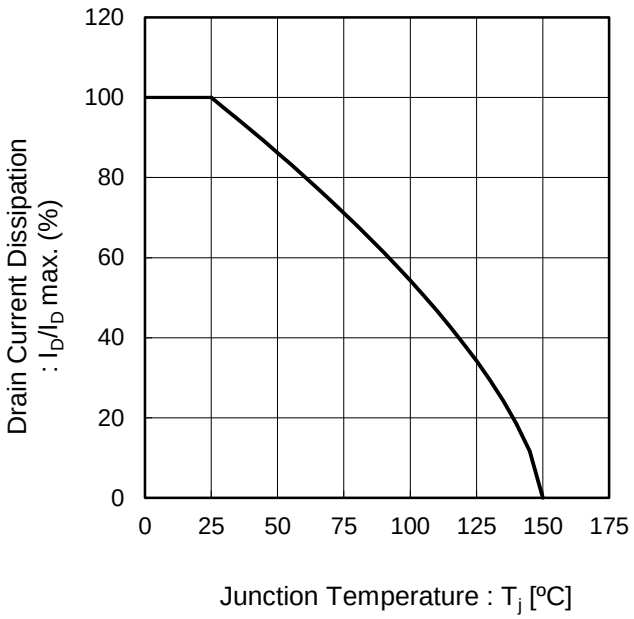


Fig.16 Drain Current Derating Curve



●Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

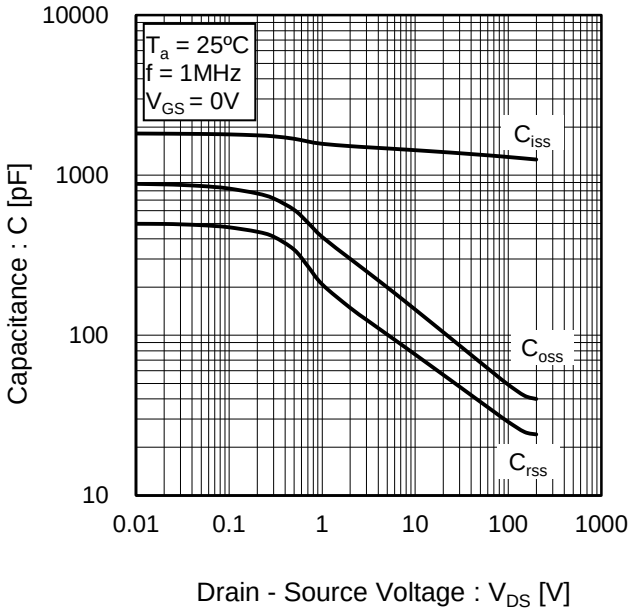


Fig.18 Switching Characteristics

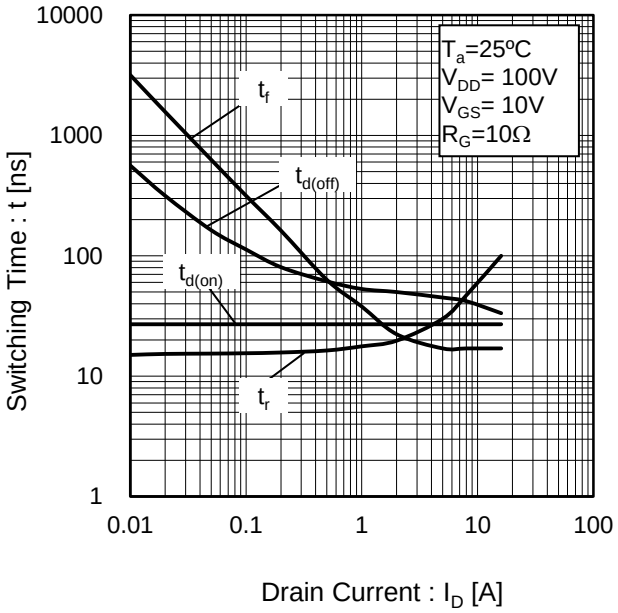
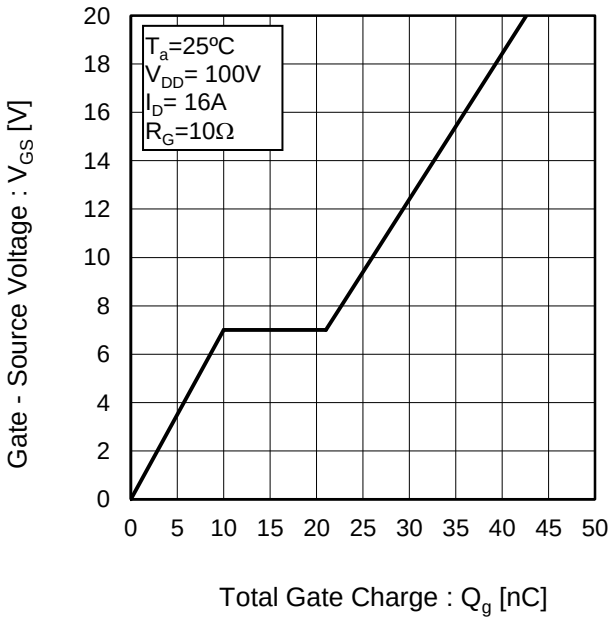


Fig.19 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.20 Source Current vs. Source - Drain Voltage

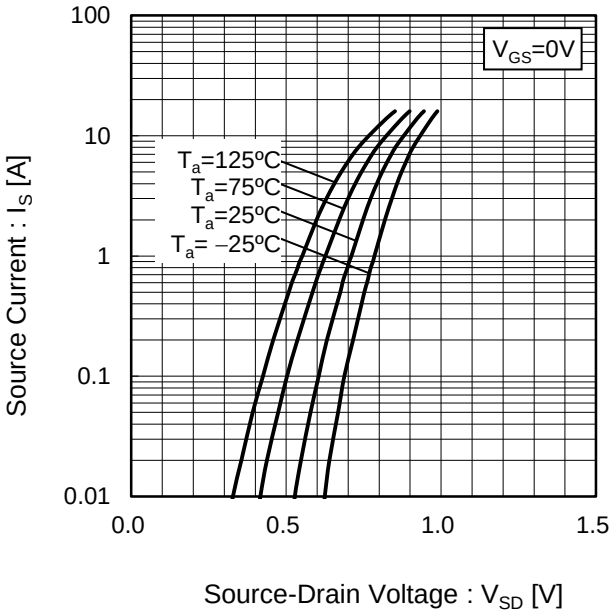
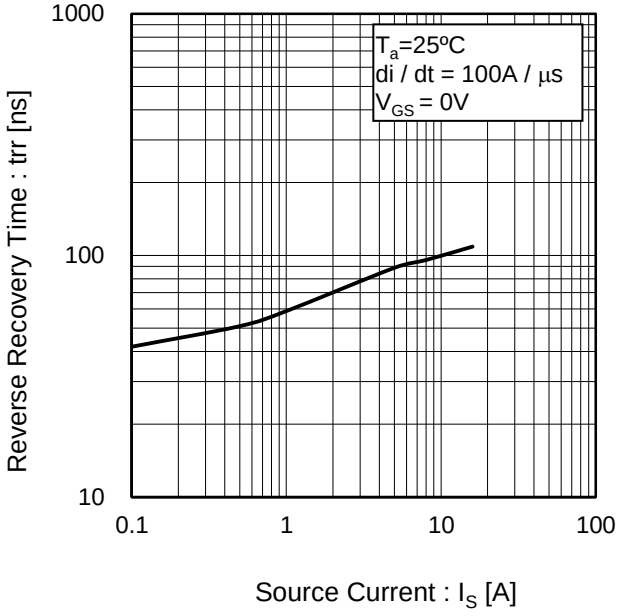


Fig21 Reverse Recovery Time vs.Source Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

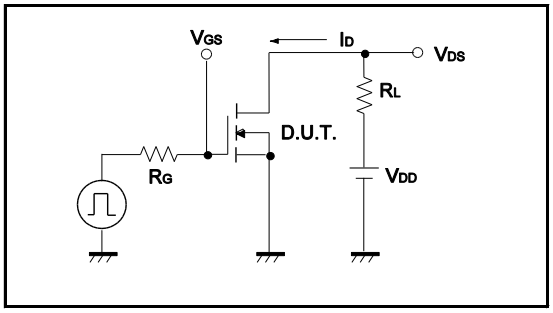


Fig.1-2 Switching Waveforms

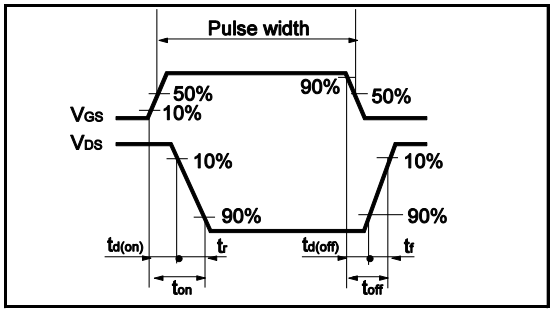


Fig.2-1 Gate Charge Measurement Circuit

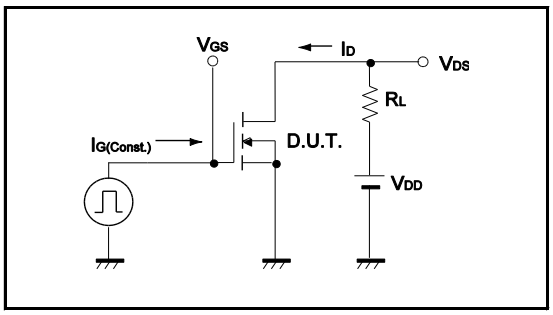


Fig.2-2 Gate Charge Waveform

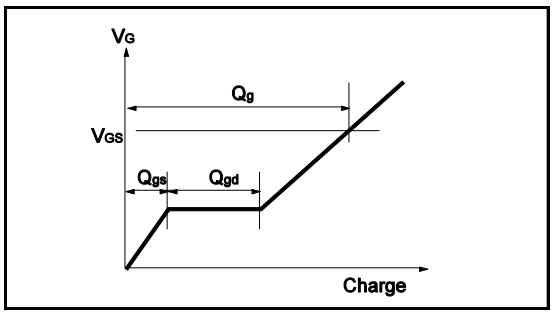


Fig.3-1 Avalanche Measurement Circuit

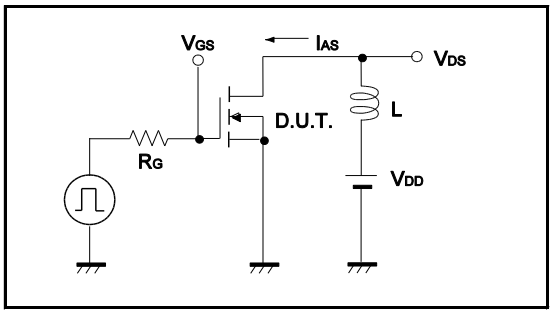
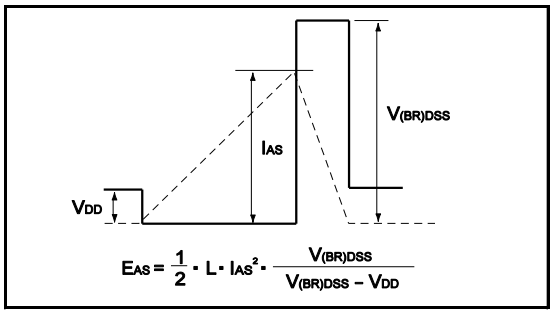
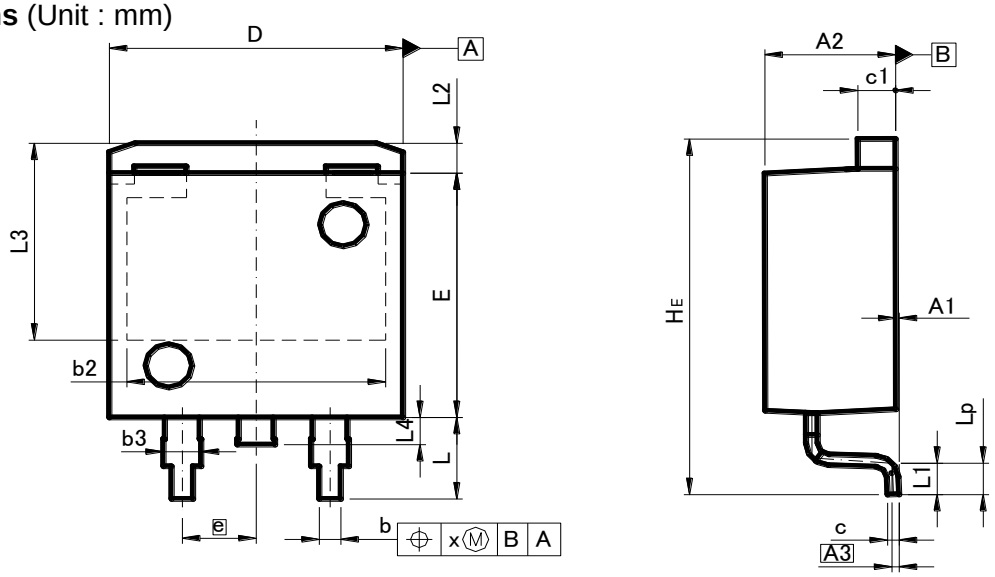


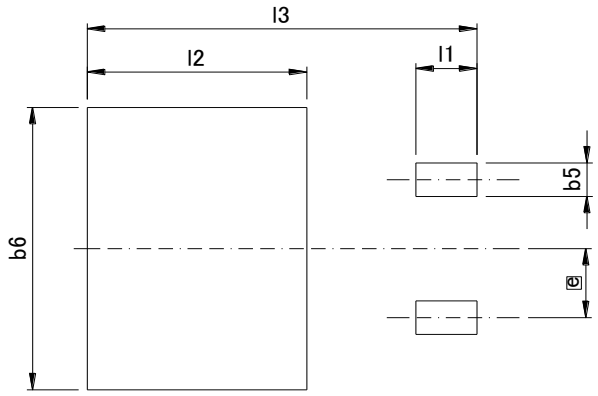
Fig.3-2 Avalanche Waveform



●**Dimensions** (Unit : mm)

LPTS





Patterm of terminal position areas

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A1	0.00	0.30	0	0.012
A2	4.30	4.70	0.169	0.185
A3	0.25		0.01	
b	0.68	0.98	0.027	0.039
b2	8.90		0.35	
b3	1.14	1.44	0.045	0.057
c	0.30	0.60	0.012	0.024
c1	1.10	1.50	0.043	0.059
D	9.80	10.40	0.386	0.409
E	8.80	9.20	0.346	0.362
e	2.54		0.10	
HE	12.80	13.40	0.504	0.528
L	2.70	3.30	0.106	0.13
L1	0.90	1.50	0.035	0.059
L2	1.10		0.043	
L3	7.25		0.285	
L4	1.00		0.039	
Lp	0.90	1.50	0.035	0.059
x	–	0.25	–	0.01

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b5	–	1.23	–	0.049
b6	–	10.40	–	0.409
l1	–	2.10	–	0.083
l2	–	7.55	–	0.297
l3	–	13.40	–	0.528

Dimension in mm/inches

Notes

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