RCJ700N20

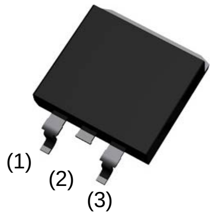
Nch 200V 70A Power MOSFET

Datasheet

V_{DSS}	200V
$R_{DS(on)}$ (Max.)	42.7mΩ
I_D	70A
P_D	40W

●Outline

LPT(S)
(SC-83)



●Features

1) Low on-resistance.

2) Fast switching speed.

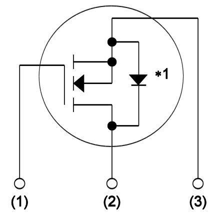
3) Drive circuits can be simple.

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	RCJ700N20

●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	±70	A
	T_c = 100°C	I_D *1	±38	A
Pulsed drain current		$I_{D,pulse}$ *2	±140	A
Gate - Source voltage		V_{GSS}	±30	V
Avalanche energy, single pulse		E_{AS} *3	396	mJ
Avalanche current		I_{AR} *3	35	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}	-	-	3.12	°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	-	-	25	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	3.0	-	5.0	V
Static drain - source on - state resistance	$R_{DS(on)}$ *5	V_{GS} = 10V, I_D = 35A	-	30.5	42.7	mΩ
		V_{GS} = 10V, I_D = 35A T_j = 125°C	-	62.0	87.0	
Forward transfer admittance	g_{fs}	V_{DS} = 10V, I_D = 35A	15.3	30.6	-	S

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	6900	-	pF
Output capacitance	C_{oss}	V_{DS} = 25V	-	400	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	230	-	
Turn - on delay time	$t_{d(on)}$ *5	$V_{DD} \simeq$ 100V, V_{GS} = 10V	-	70	-	ns
Rise time	t_r *5	I_D = 35A	-	340	-	
Turn - off delay time	$t_{d(off)}$ *5	R_L = 2.8Ω	-	160	-	
Fall time	t_f *5	R_G = 10Ω	-	160	-	

●Gate Charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *5	$V_{DD} \simeq$ 100V	-	125	-	nC
Gate - Source charge	Q_{gs} *5	I_D = 70A	-	40	-	
Gate - Drain charge	Q_{gd} *5	V_{GS} = 10V	-	50	-	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} \simeq$ 100V, I_D = 70A	-	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	-	-	70	A
Pulsed source current	I_{SM} *2		-	-	140	A
Forward voltage	V_{SD} *5	V_{GS} = 0V, I_S = 70A	-	-	1.5	V
Reverse recovery time	t_{rr} *5	I_S = 35A	-	130	-	ns
Reverse recovery charge	Q_{rr} *5	di/dt = 100A/μs	-	600	-	nC

*1 Limited only by maximum temperature allowed.

*2 Pw ≤ 10μs, Duty cycle ≤ 1%

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

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

*5 Pulsed

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

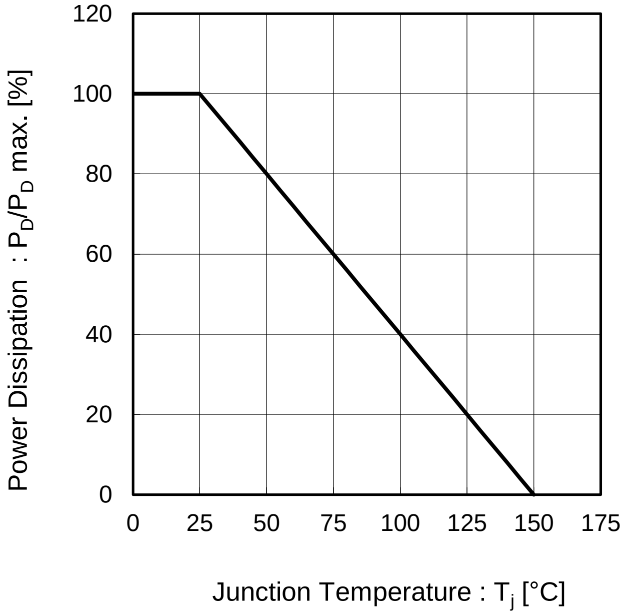
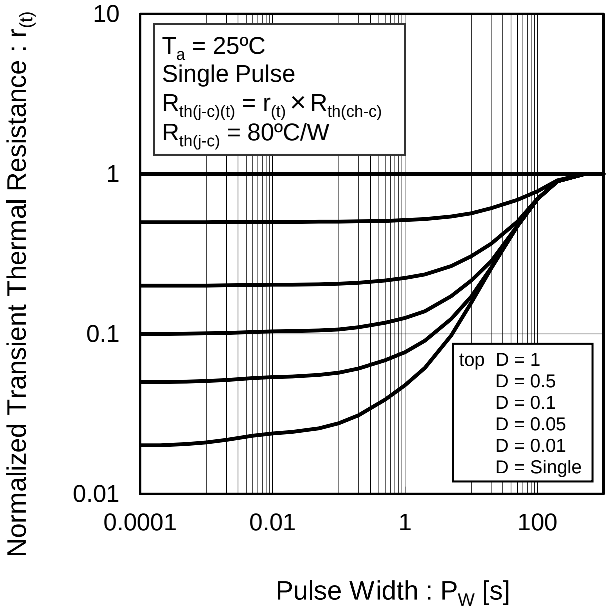


Fig.2 Normalized Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.3 Avalanche Current vs Inductive Load

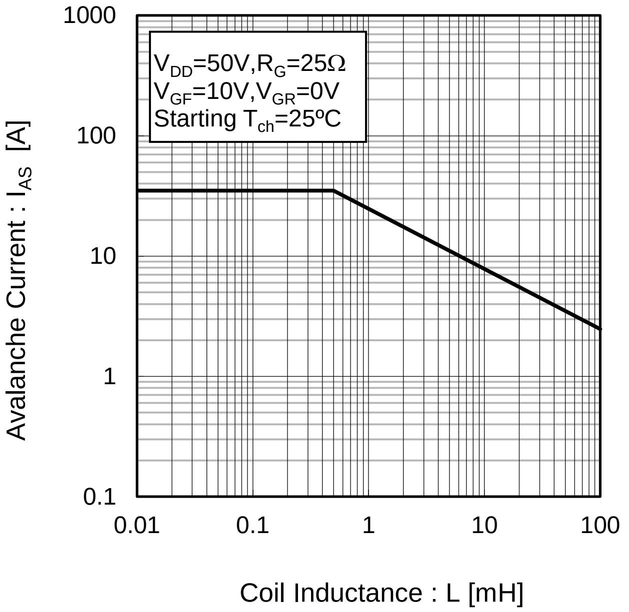


Fig.4 Avalanche Energy Derating Curve vs Junction Temperature

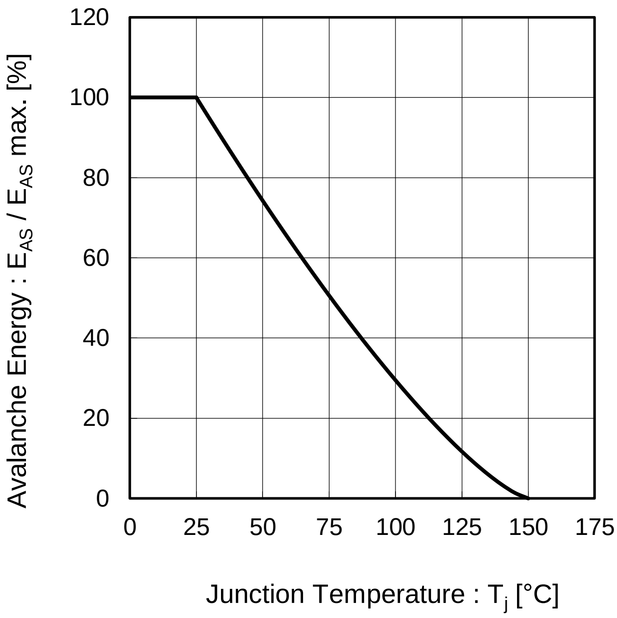


Fig.5 Typical Output Characteristics(I)

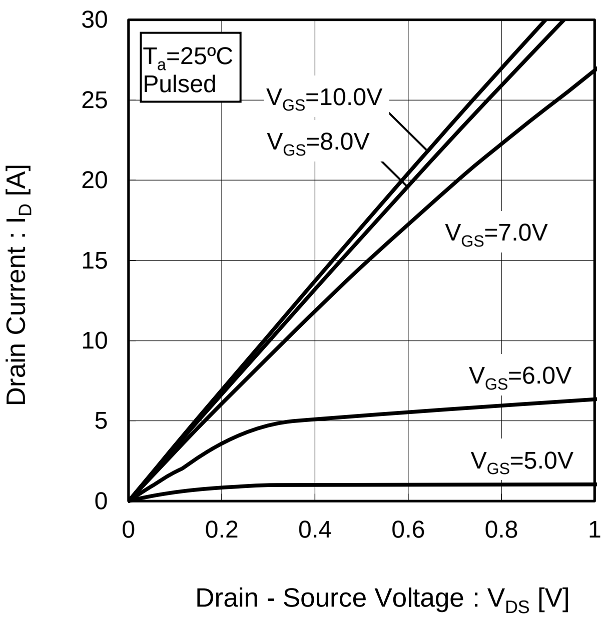
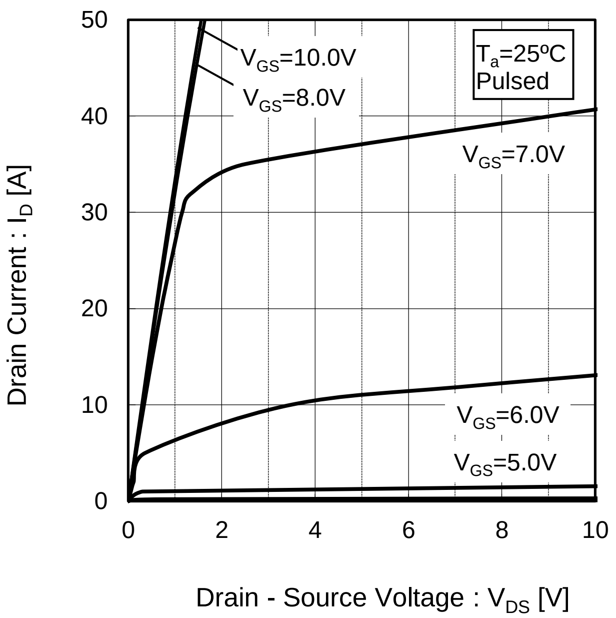


Fig.6 Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.7 Breakdown Voltage vs. Junction Temperature

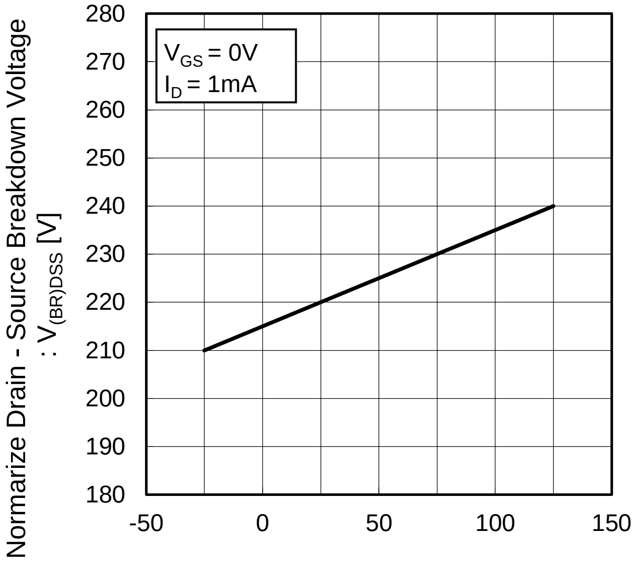


Fig.8 Typical Transfer Characteristics

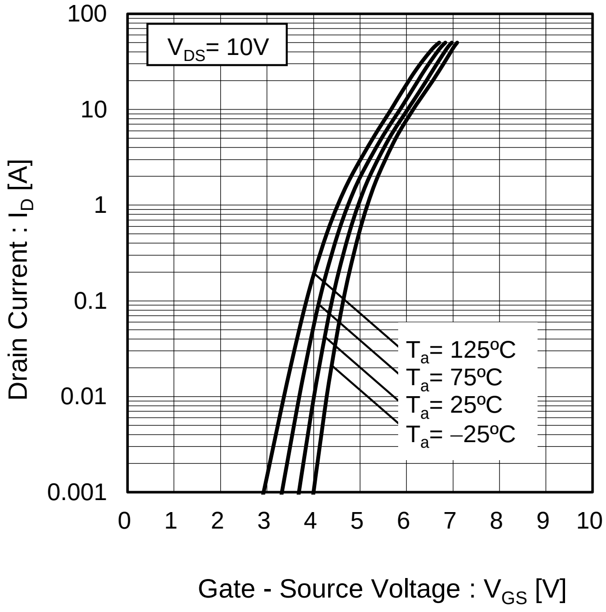


Fig.9 Gate Threshold Voltage vs. Junction Temperature

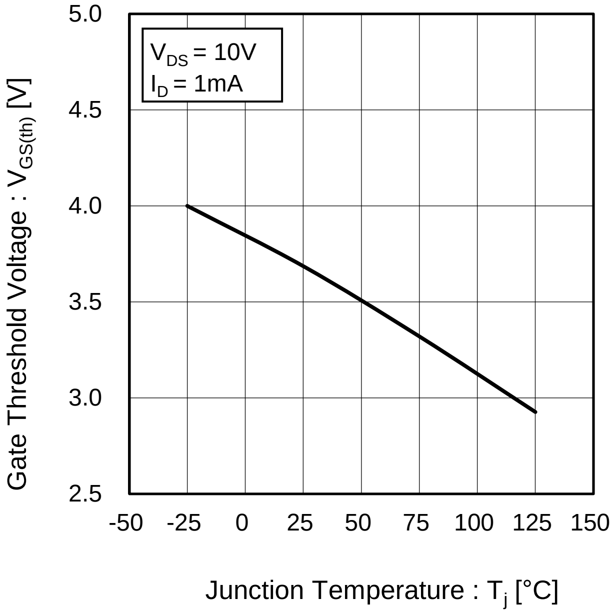
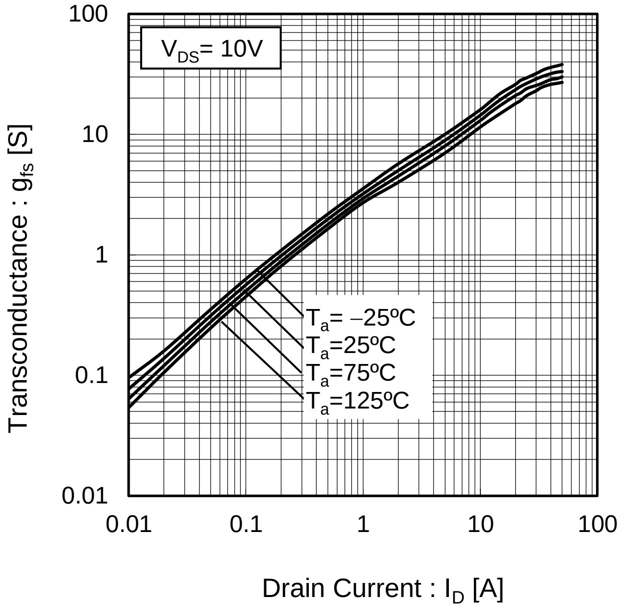


Fig.10 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.11 Static Drain - Source On - State Resistance vs. Gate Source Voltage

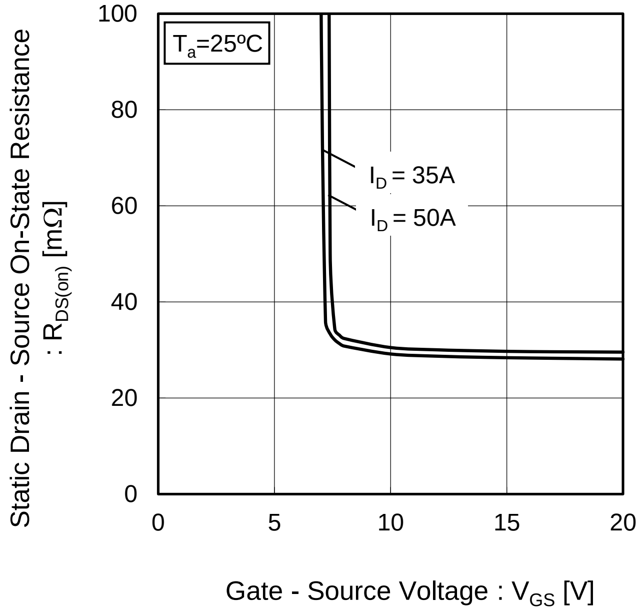


Fig.12 Static Drain - Source On - State Resistance vs. Drain Current(I)

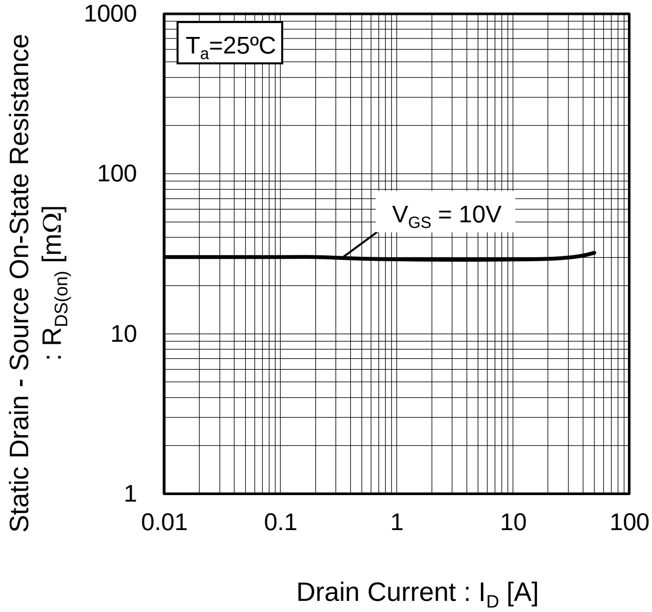
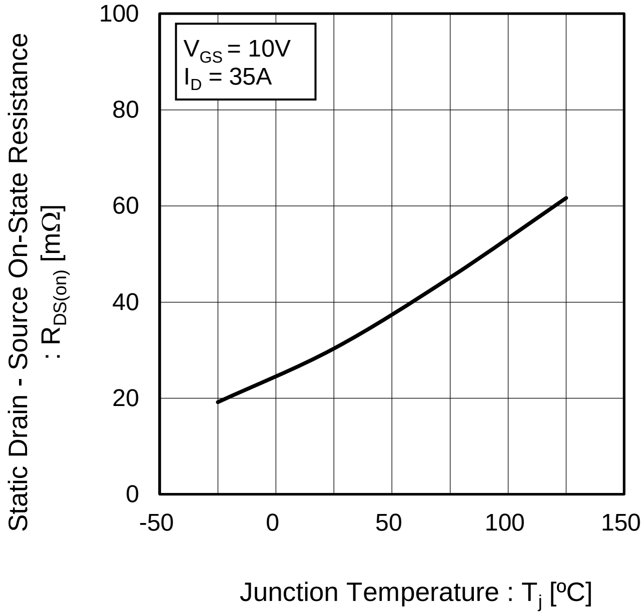


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

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

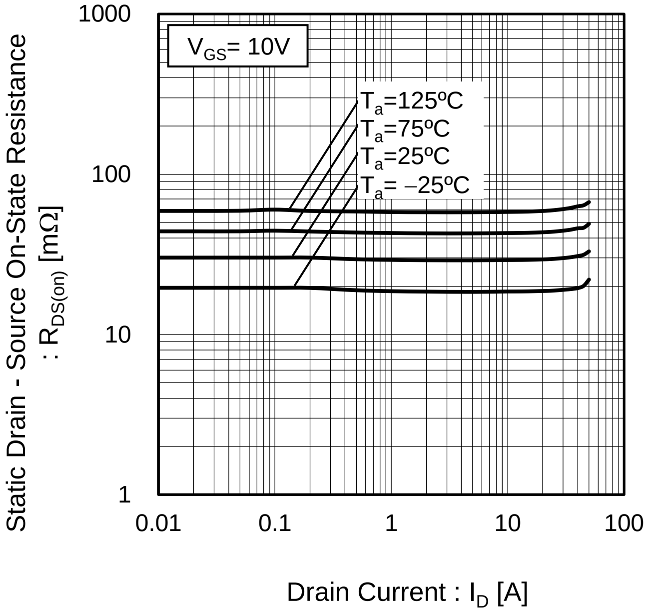
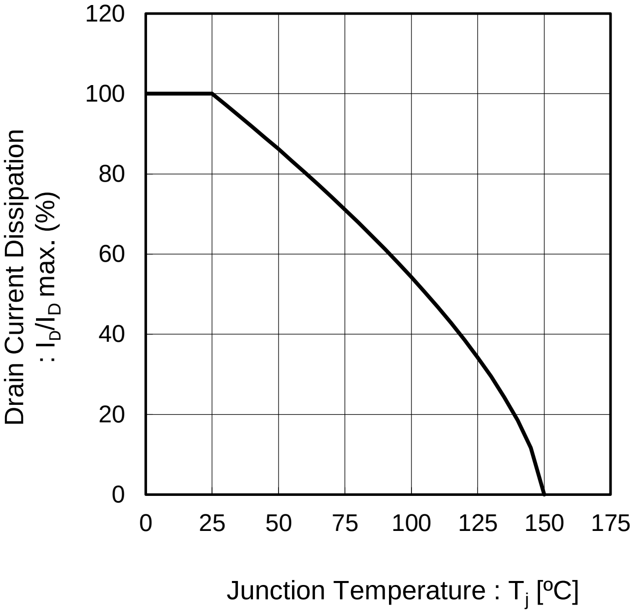


Fig.15 Drain Current Derating Curve



●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

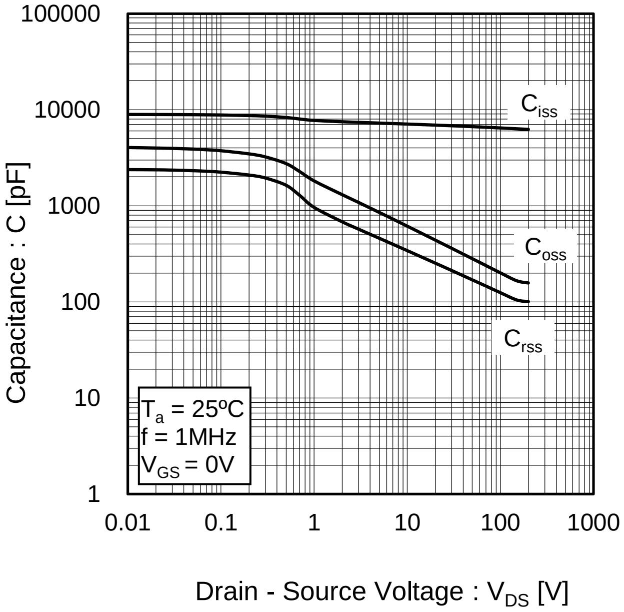


Fig.17 Switching Characteristics

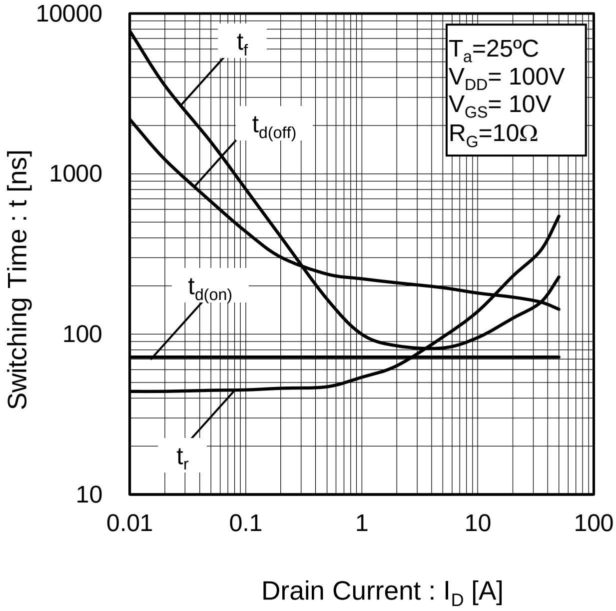
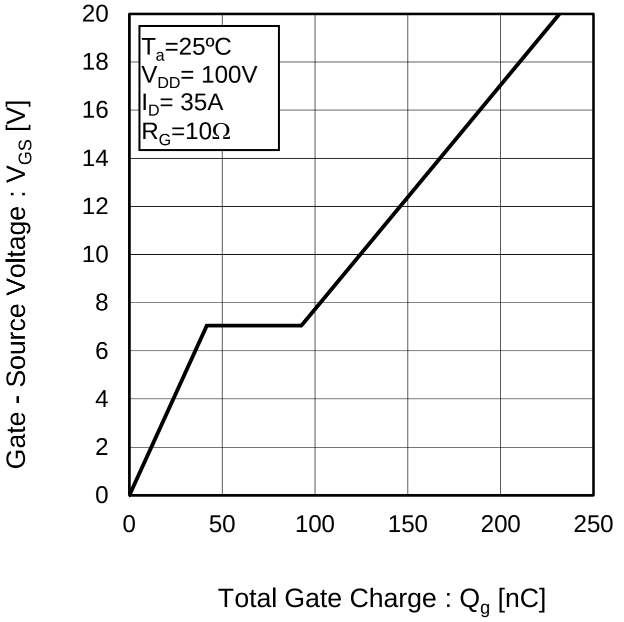


Fig.18 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.19 Source Current vs. Source - Drain Voltage

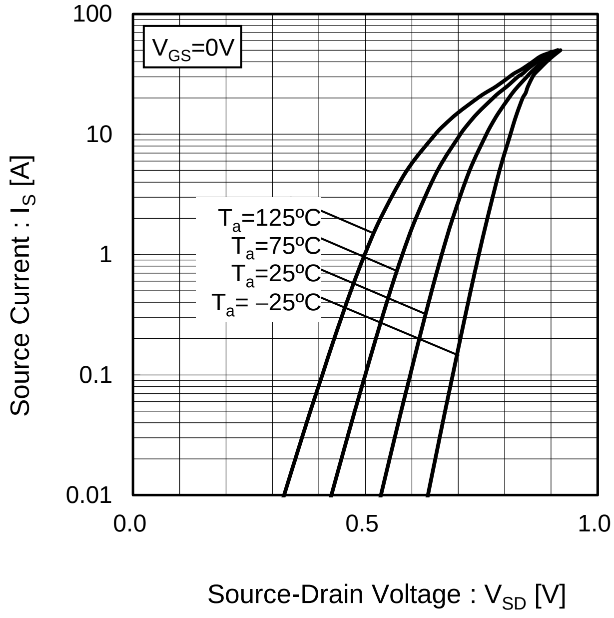
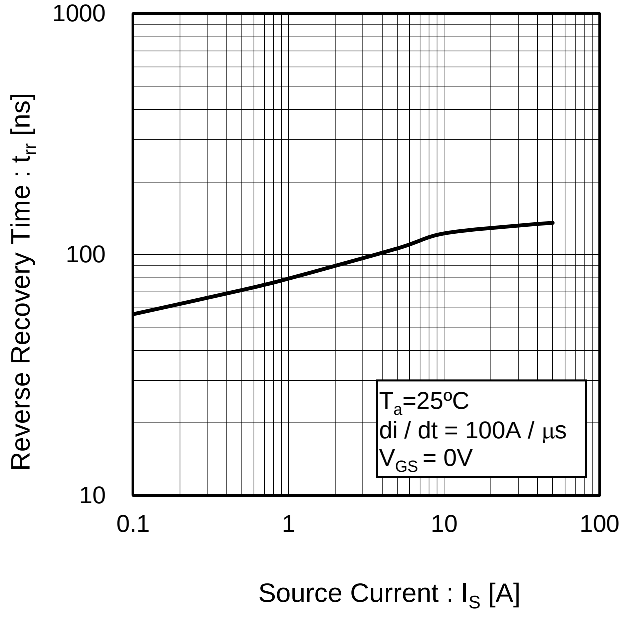


Fig20 Reverse Recovery Time vs.Source Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

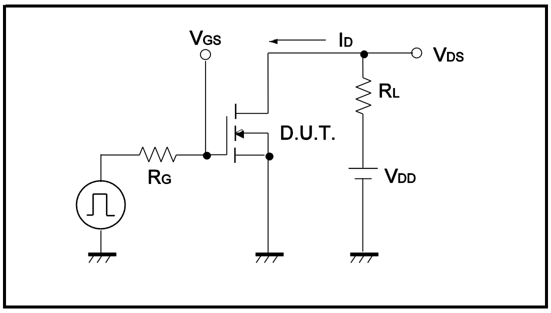


Fig.1-2 Switching Waveforms

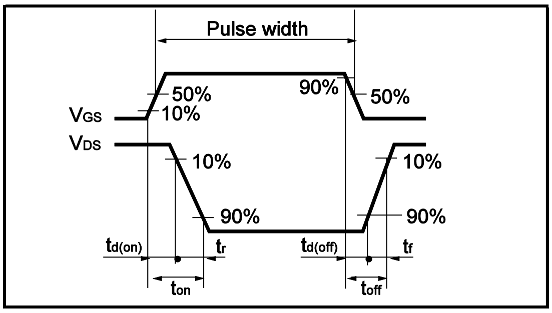


Fig.2-1 Gate Charge Measurement Circuit

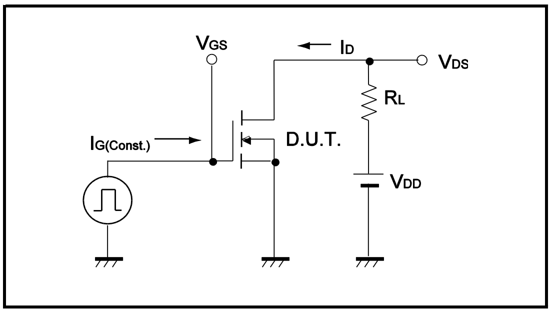


Fig.2-2 Gate Charge Waveform

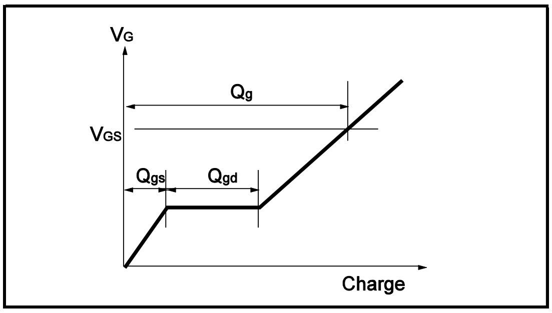


Fig.3-1 Avalanche Measurement Circuit

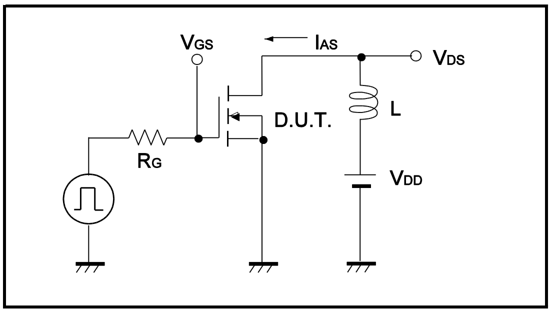
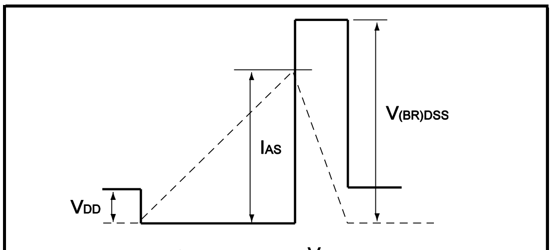


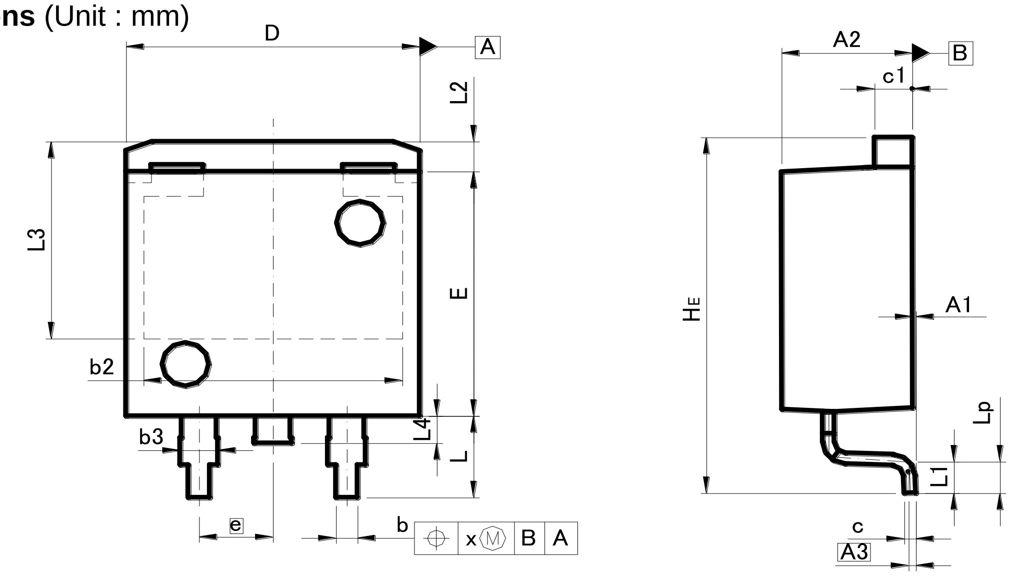
Fig.3-2 Avalanche Waveform

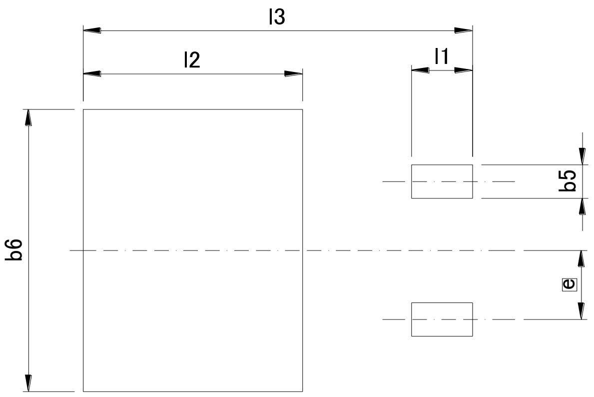


$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AS}^2 \cdot \frac{V_{(BR)DSS}}{V_{(BR)DSS} - V_{DD}}$$

●Dimensions (Unit : mm)

LPTS





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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A1	0.00	0.30	0.000	0.012
A2	4.30	4.70	0.169	0.185
A3	0.25		0.010	
b	0.68	0.98	0.027	0.039
b2	8.90		0.350	
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		0.100	
HE	12.80	13.40	0.504	0.528
L	2.70	3.30	0.106	0.130
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	−	0.010

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

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