



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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Email & Skype: info@chipsmall.com Web: www.chipsmall.com

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$V_{DSS}$	600V
$R_{DS(on)}(Max.)$	0.196Ω
$I_D$	±20A
$P_D$	68W

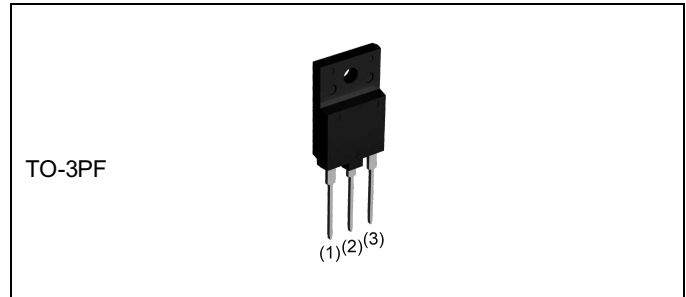
### ●Features

- 1) Low on-resistance.
- 2) Ultra fast switching speed.
- 3) Parallel use is easy.
- 4) Pb-free lead plating ; RoHS compliant

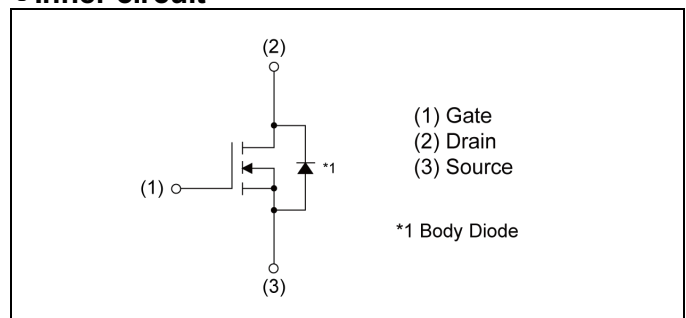
### ●Application

Switching

### ●Outline



### ●Inner circuit



### ●Packaging specifications

Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	360
	Taping code	C8
	Marking	R6020KNZ

### ●Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain - Source voltage	$V_{DSS}$	600	V
Continuous drain current ( $T_c = 25^\circ\text{C}$ )	$I_D^{*1}$	±20	A
Pulsed drain current	$I_{DP}^{*2}$	±60	A
Gate - Source voltage	static	±20	V
	AC( $f > 1\text{Hz}$ )	±30	V
Avalanche current, single pulse	$I_{AS}$	3.4	A
Avalanche energy, single pulse	$E_{AS}^{*3}$	418	mJ
Power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	68	W
Junction temperature	$T_j$	150	°C
Operating junction and storage temperature range	$T_{stg}$	-55 to +150	°C

### ● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	$R_{thJC}^{*4}$	-	-	1.8	°C/W
Thermal resistance, junction - ambient	$R_{thJA}$	-	-	40	°C/W
Soldering temperature, wavesoldering for 10s	$T_{sold}$	-	-	265	°C

### ● Electrical characteristics ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 1mA$	600	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 600V, V_{GS} = 0V$	-	-	100	$\mu\text{A}$
		$T_j = 125^\circ\text{C}$	-	-	1000	
Gate - Source leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = 10V, I_D = 1mA$	3	-	5	V
Static drain - source on - state resistance	$R_{DS(on)}^{*5}$	$V_{GS} = 10V, I_D = 9.5A$	-	0.170	0.196	$\Omega$
		$T_j = 125^\circ\text{C}$	-	0.360	-	
Gate resistance	$R_G$	$f = 1MHz, \text{open drain}$	-	2.3	-	$\Omega$

**●Electrical characteristics (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Forward Transfer Admittance	Y <sub>fs</sub>   <sup>*5</sup>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 10A	5	10	-	S
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0V	-	1550	-	pF
Output capacitance	C <sub>oss</sub>	V <sub>DS</sub> = 25V	-	1350	-	
Reverse transfer capacitance	C <sub>rss</sub>	f = 1MHz	-	55	-	
Turn - on delay time	t <sub>d(on)</sub> <sup>*5</sup>	V <sub>DD</sub> ≈ 300V, V <sub>GS</sub> = 10V	-	30	-	ns
Rise time	t <sub>r</sub> <sup>*5</sup>	I <sub>D</sub> = 10A	-	30	-	
Turn - off delay time	t <sub>d(off)</sub> <sup>*5</sup>	R <sub>L</sub> ≈ 30Ω	-	55	-	
Fall time	t <sub>f</sub> <sup>*5</sup>	R <sub>G</sub> = 10Ω	-	10	-	

**●Gate charge characteristics (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q <sub>g</sub> <sup>*5</sup>	V <sub>DD</sub> ≈ 300V	-	40	-	nC
Gate - Source charge	Q <sub>gs</sub> <sup>*5</sup>	I <sub>D</sub> = 20A	-	12	-	
Gate - Drain charge	Q <sub>gd</sub> <sup>*5</sup>	V <sub>GS</sub> = 10V	-	15	-	
Gate plateau voltage	V <sub>(plateau)</sub>	V <sub>DD</sub> ≈ 300V, I <sub>D</sub> = 20A	-	6.4	-	V

\*1 Limited only by maximum channel temperature allowed.

\*2 P<sub>w</sub> ≤ 10μs, Duty cycle ≤ 1%

\*3 L ≐ 70mH, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, STARTING T<sub>j</sub>=25°C

\*4 T<sub>C</sub>=25°C

\*5 Pulsed

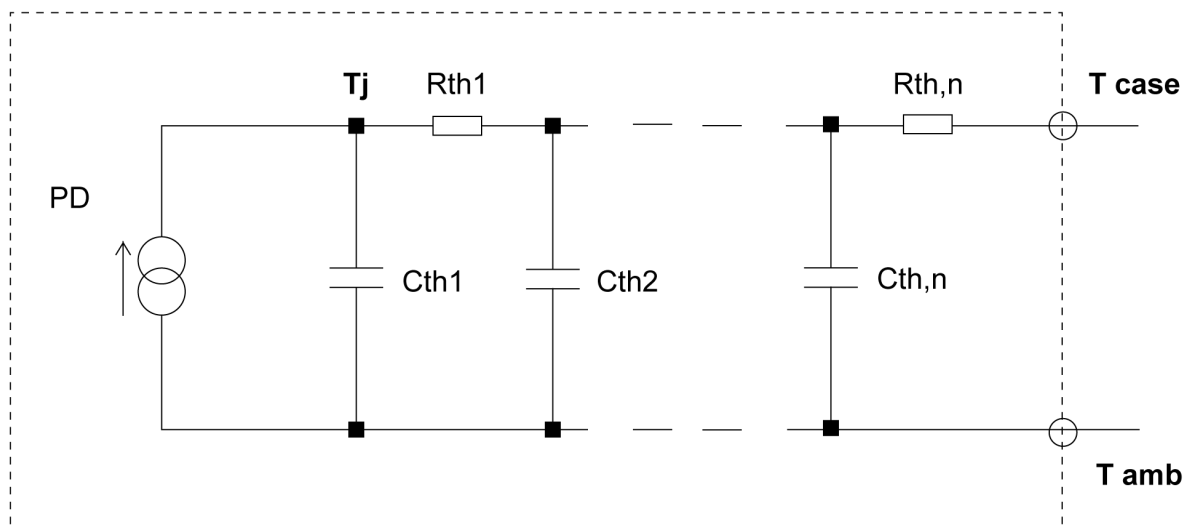
●Body diode electrical characteristics (Source-Drain) ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous forward current	$I_S^{*1}$	$T_C = 25^\circ\text{C}$	-	-	20	A
Pulse forward current	$I_{SP}^{*2}$		-	-	60	A
Forward voltage	$V_{SD}^{*5}$	$V_{GS} = 0\text{V}, I_S = 20\text{A}$	-	-	1.5	V
Reverse recovery time	$t_{rr}^{*5}$	$I_S = 20\text{A}$ $di/dt = 100\text{A}/\mu\text{s}$	-	500	-	ns
Reverse recovery charge	$Q_{rr}^{*5}$		-	7.5	-	$\mu\text{C}$
Peak reverse recovery current	$I_{rm}^{*5}$		-	30	-	A

●Typical transient thermal characteristics

Symbol	Value	Unit
$R_{th1}$	0.129	K/W
$R_{th2}$	0.627	
$R_{th3}$	1.22	

Symbol	Value	Unit
$C_{th1}$	0.00475	Ws/K
$C_{th2}$	0.0387	
$C_{th3}$	1.06	



● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

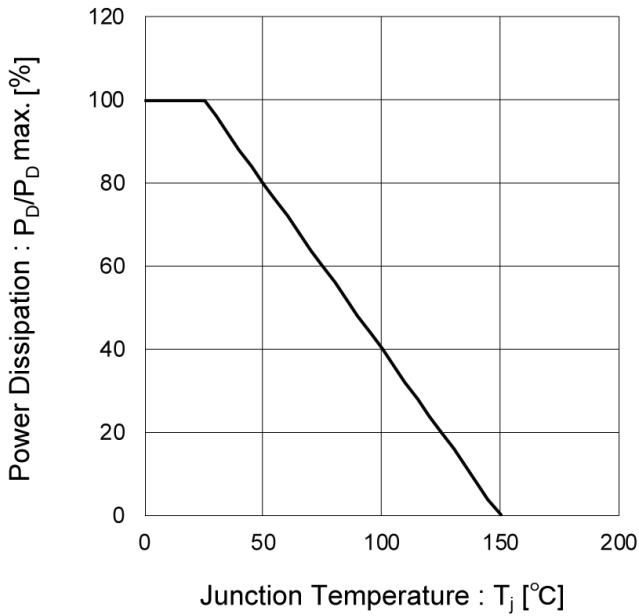


Fig.2 Maximum Safe Operating Area

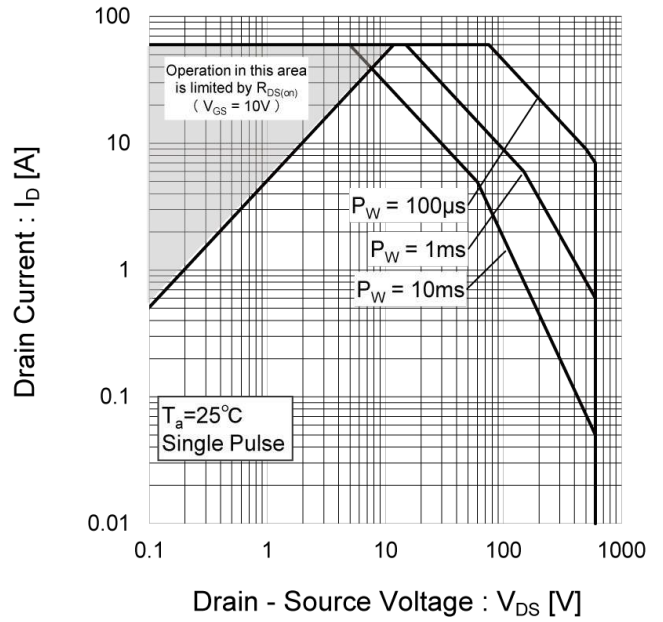
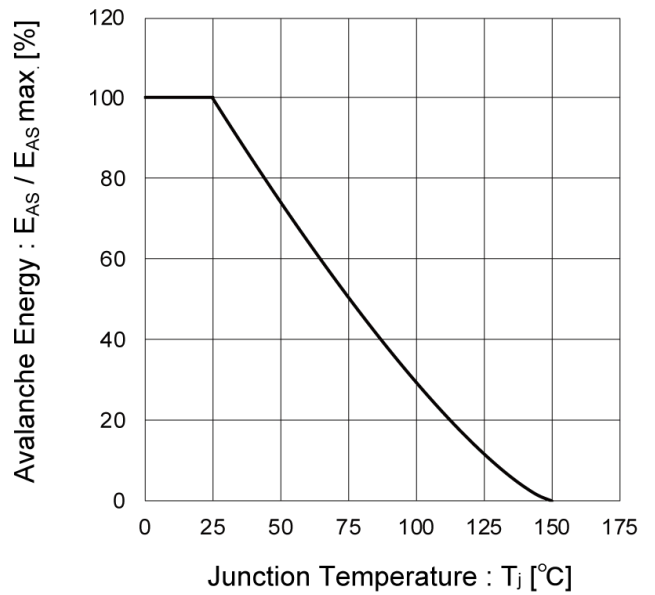


Fig.3 Avalanche Energy Derating Curve vs. Junction Temperature



● Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

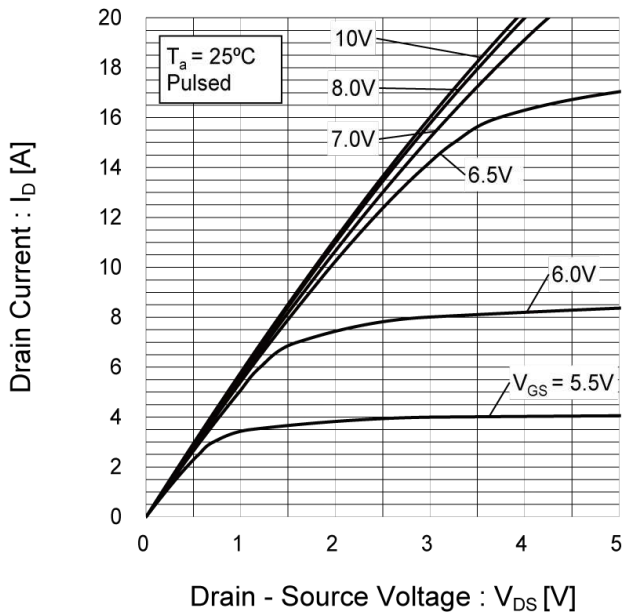
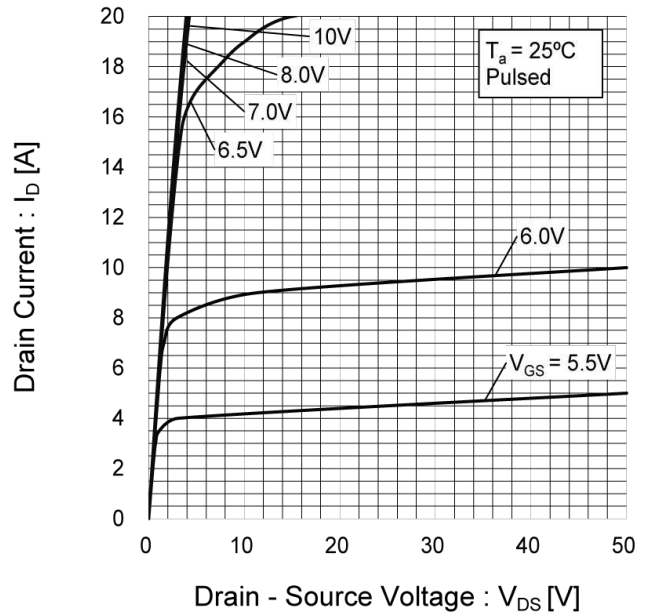


Fig.5 Typical Output Characteristics(II)



● Electrical characteristic curves

Fig.6 Breakdown Voltage vs. Junction Temperature

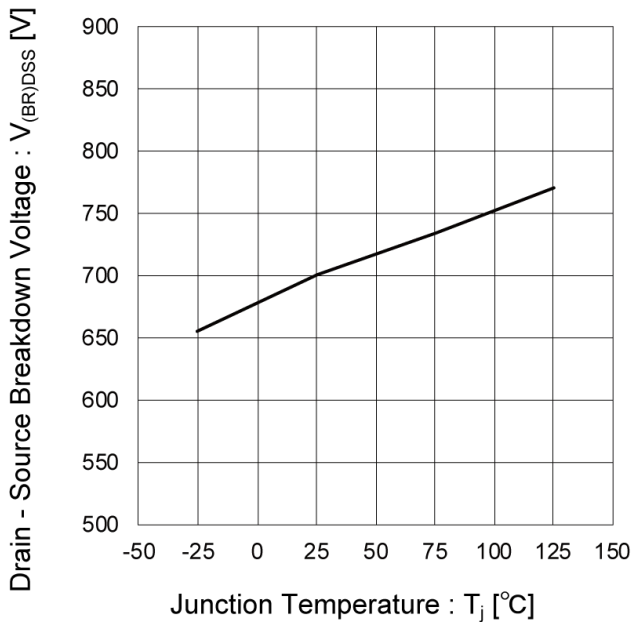


Fig.7 Typical Transfer Characteristics

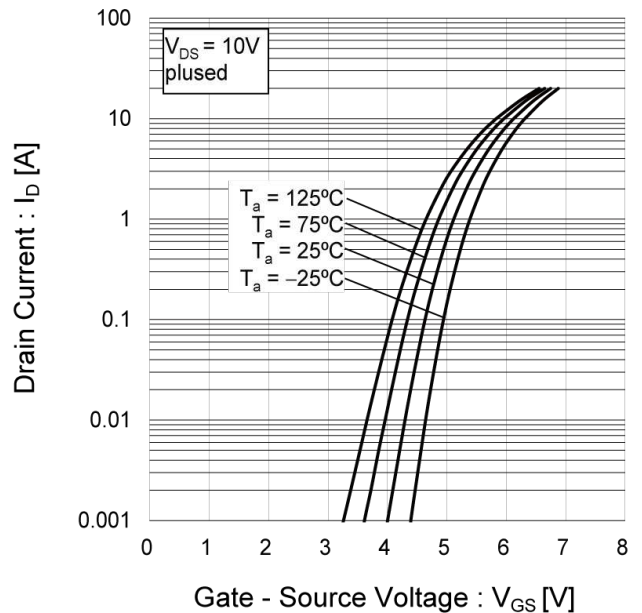


Fig.8 Gate Threshold Voltage vs. Junction Temperature

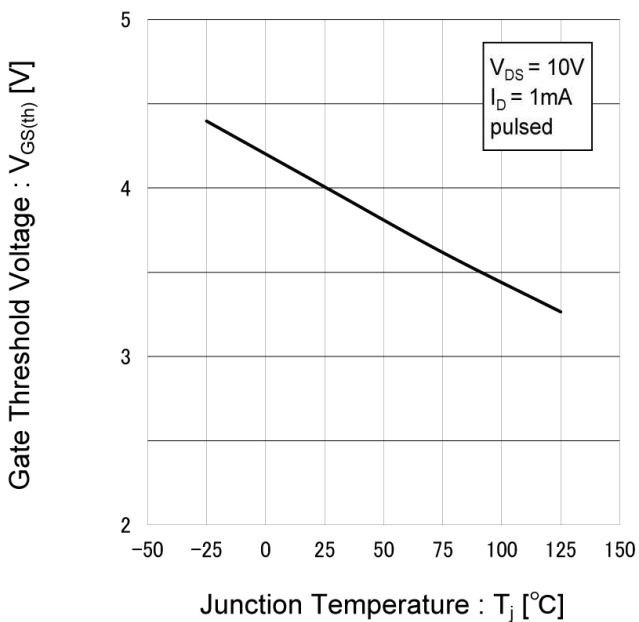
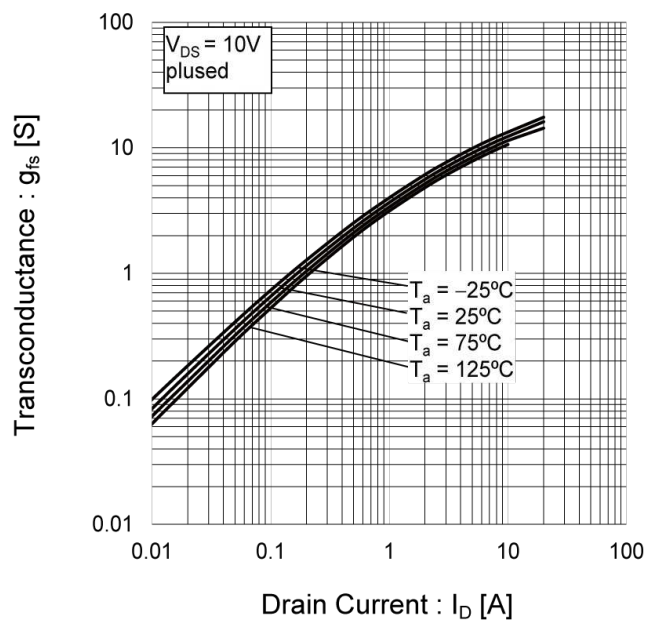


Fig.9 Forward Transfer Admittance vs. Drain Current



● Electrical characteristic curves

Fig.10 Static Drain - Source On - State Resistance vs. Gate Source Voltage

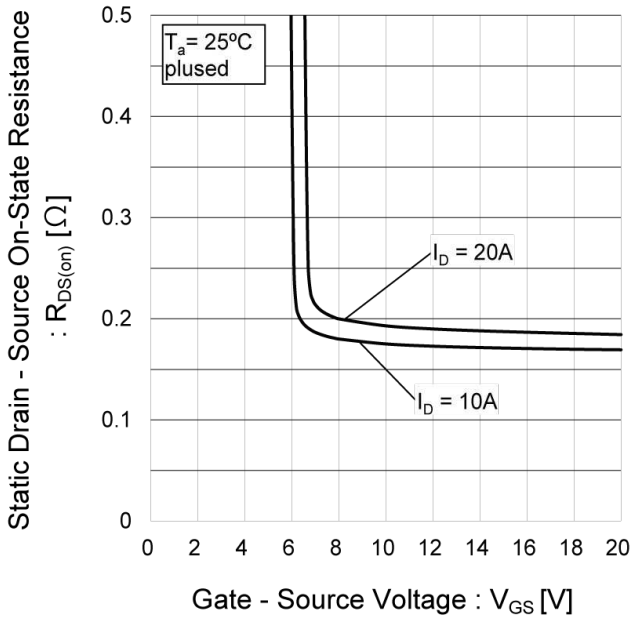


Fig.11 Static Drain - Source On - State Resistance vs. Junction Temperature

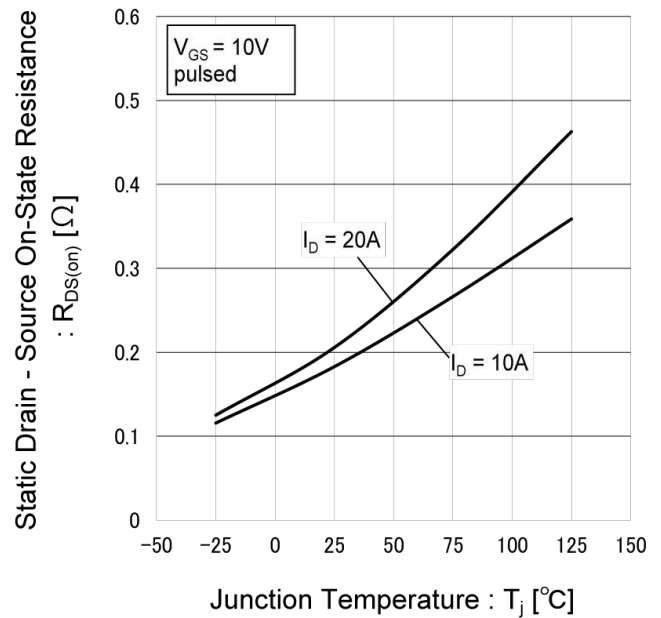
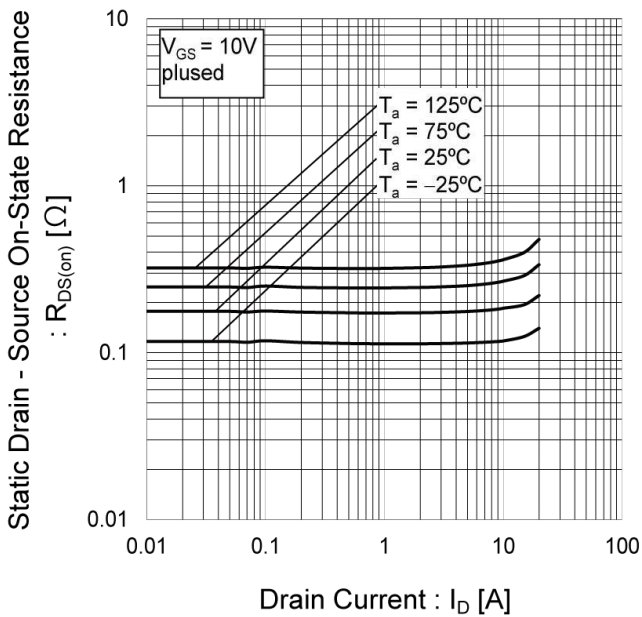


Fig.12 Static Drain - Source On - State Resistance vs. Drain Current(I)



● Electrical characteristic curves

Fig.13 Typical Capacitance vs. Drain - Source Voltage

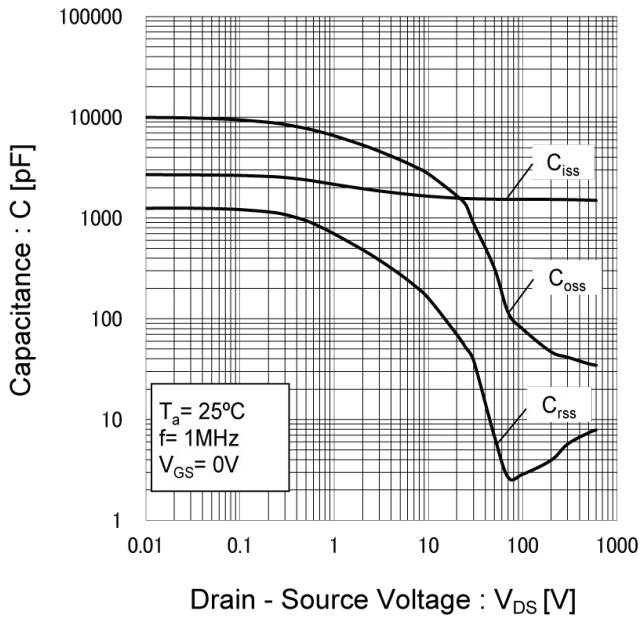


Fig.14 Switching Characteristics

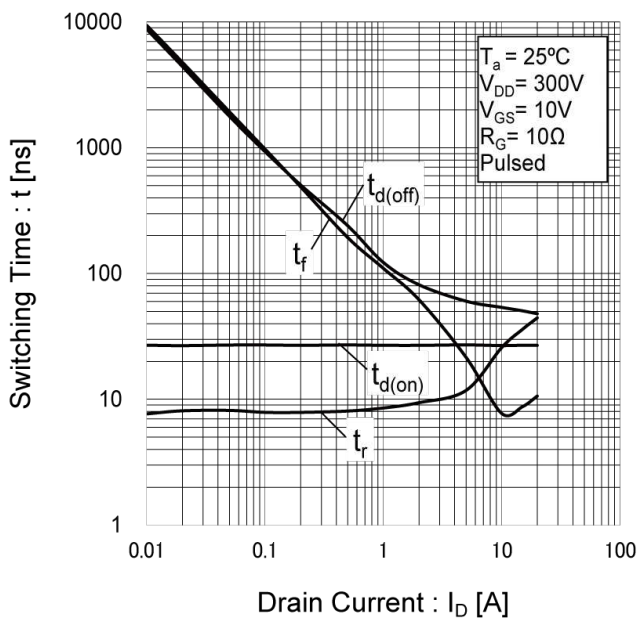
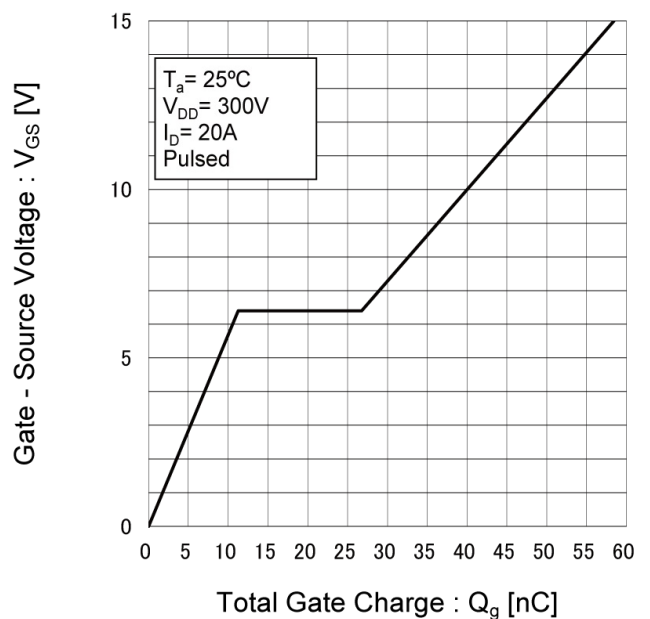


Fig.15 Dynamic Input Characteristics



● Electrical characteristic curves

Fig.16 Inverse Diode Forward Current vs. Source - Drain Voltage

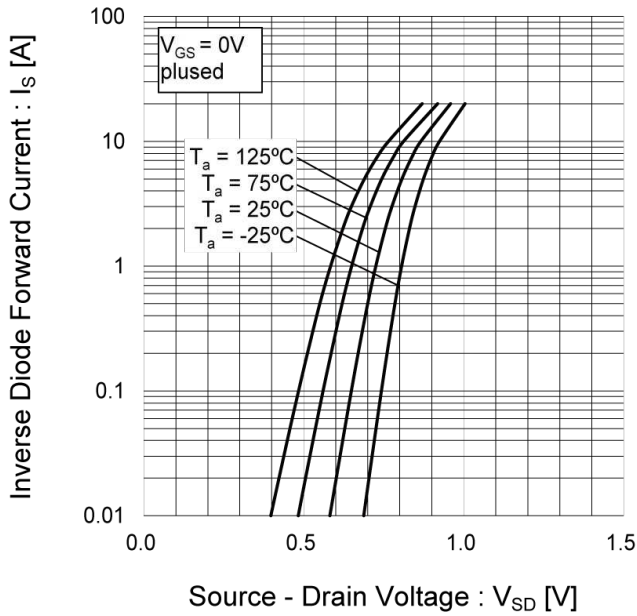
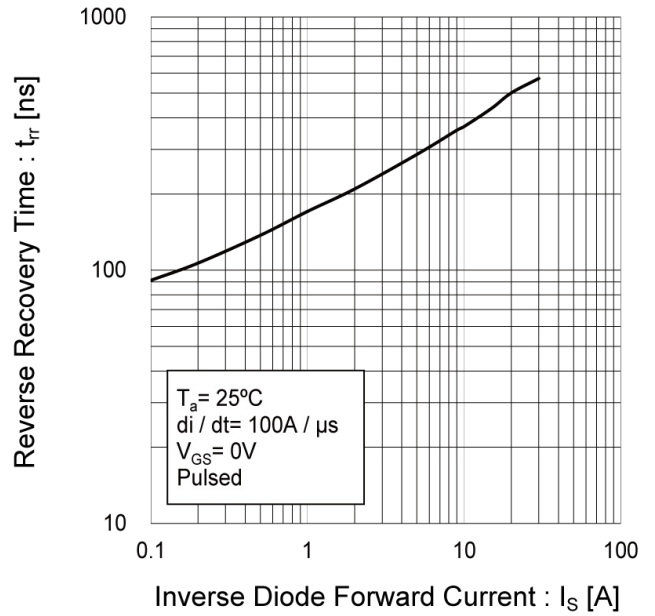


Fig.17 Reverse Recovery Time vs. Inverse Diode Forward Current



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

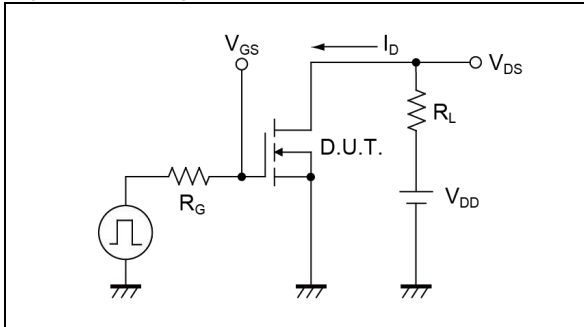


Fig.1-2 Switching Waveforms

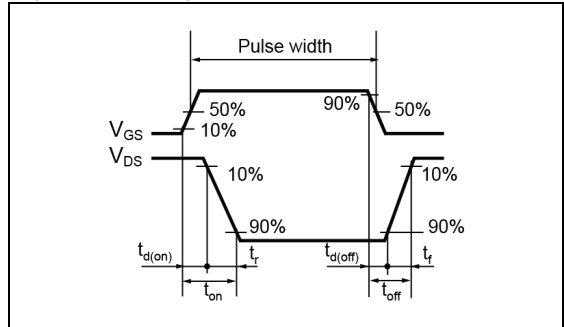


Fig.2-1 Gate Charge Measurement Circuit

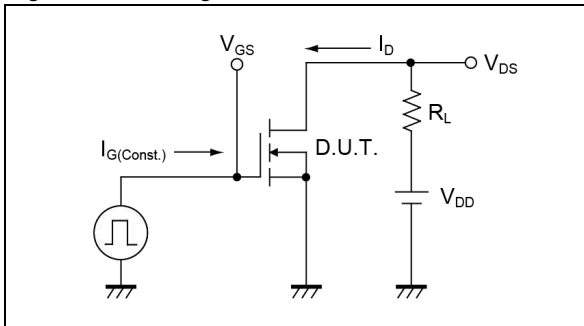


Fig.2-2 Gate Charge Waveform

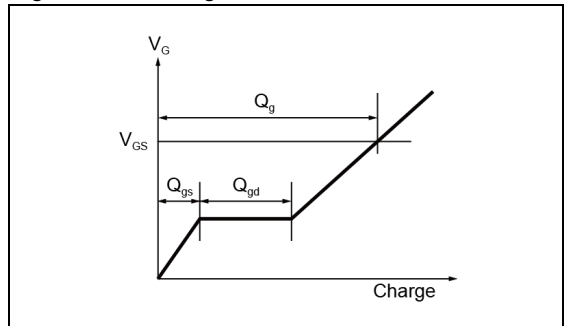


Fig.3-1 Avalanche Measurement Circuit

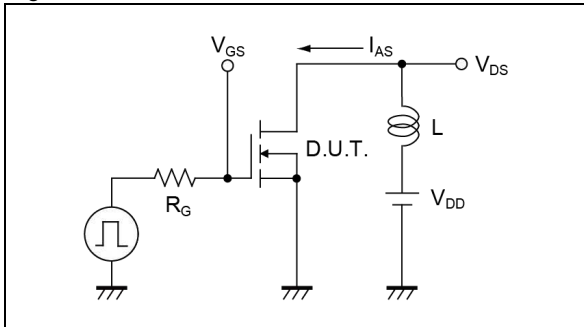


Fig.3-2 Avalanche Waveform

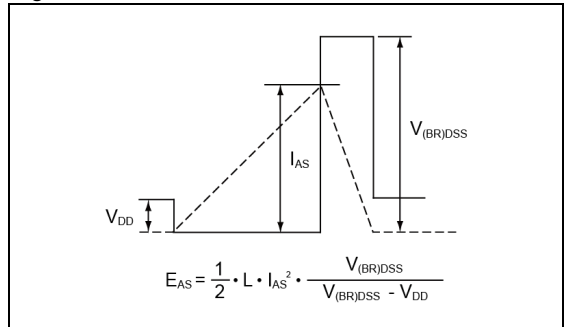


Fig.4-1 dv/dt Measurement Circuit

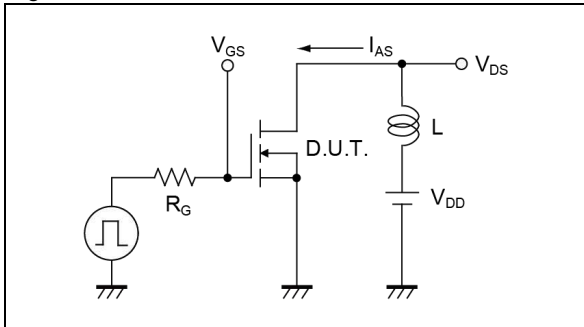


Fig.4-2 dv/dt Waveform

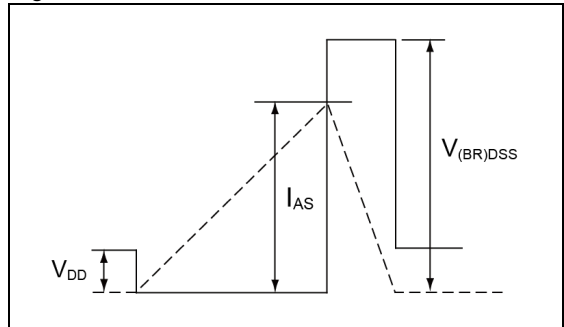


Fig.5-1 dv/dt Measurement Circuit

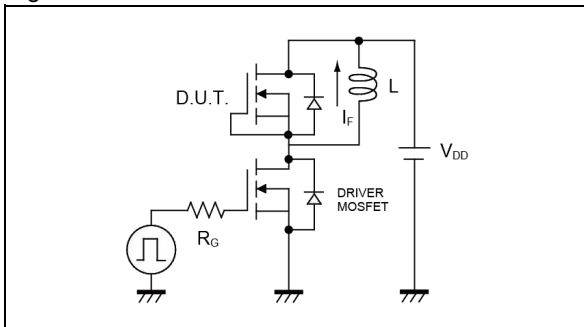
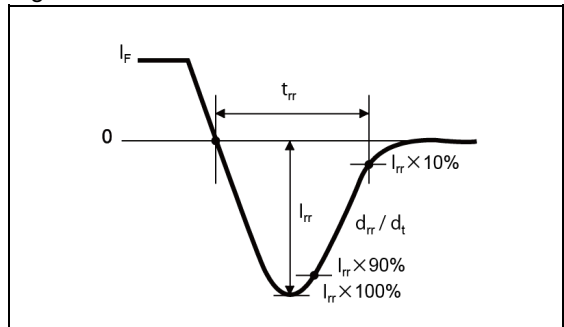
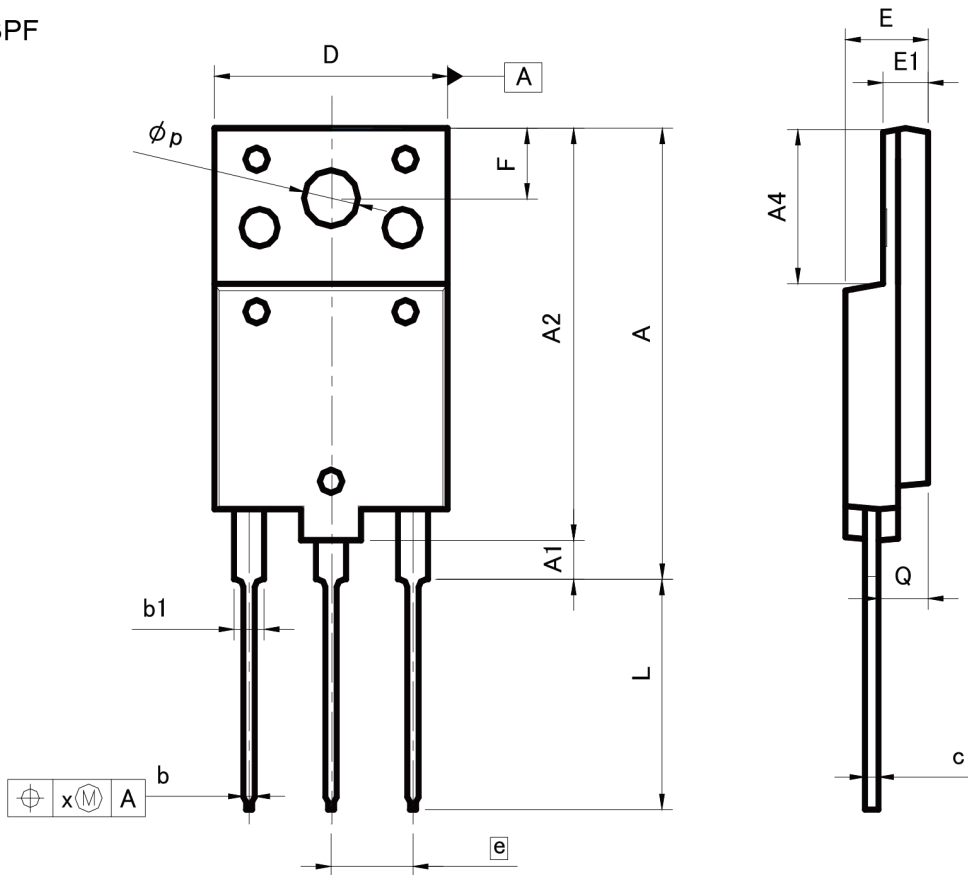


Fig.5-2 dv/dt Waveform



●Dimensions

TO-3PF



DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	26.30	26.70	1.035	1.051
A1	2.30	2.70	0.091	0.106
A2	26.30	26.70	1.035	1.051
A4	9.80	10.20	0.386	0.402
b	0.65	0.95	0.026	0.037
b1	1.80	2.20	0.071	0.087
c	0.80	1.10	0.031	0.043
D	15.30	15.70	0.602	0.618
E	5.30	5.70	0.209	0.224
e	5.45		0.215	-
E1	2.80	3.20	0.110	0.126
F	4.30	4.70	0.169	0.185
L	14.60	15.00	0.575	0.591
p	3.40	3.80	0.134	0.150
Q	3.10	3.50	0.122	0.138
x	-	0.50	-	0.020

Dimension in mm/inches

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R6020KNZ - Web Page

[Distribution Inventory](#)

Part Number	R6020KNZ
Package	TO-3PF
Unit Quantity	360
Minimum Package Quantity	360
Packing Type	Tube
Constitution Materials List	inquiry
RoHS	Yes