



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.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



V_{DSS}	600V
$R_{DS(on)}(Max.)$	0.535Ω
I_D	±9A
P_D	48W

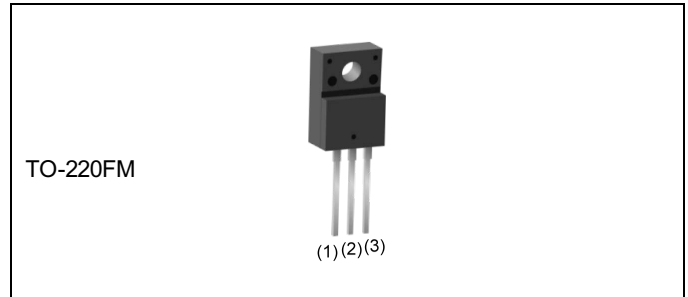
●Features

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

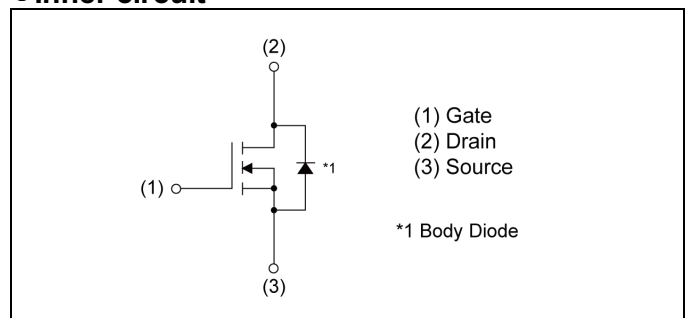
●Application

Switching

●Outline



●Inner circuit



●Packaging specifications

Type	Packing	Bulk
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	500
	Taping code	-
	Marking	R6009KNX

●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}	±9	A
Pulsed drain current		I_{DP}^{*2}	±27	A
Gate - Source voltage	static	V_{GSS}	±20	V
	AC($f > 1\text{Hz}$)		±30	V
Avalanche current, single pulse		I_{AS}	1.4	A
Avalanche energy, single pulse		E_{AS}^{*3}	153	mJ
Power dissipation ($T_c = 25^\circ\text{C}$)		P_D	48	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}	-	-	2.6	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	70	°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	μA
		$T_j = 125^\circ\text{C}$	-	-	1000	
Gate - Source leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = 10V, I_D = 1mA$	3	-	5	V
Static drain - source on - state resistance	$R_{DS(on)}^{*5}$	$V_{GS} = 10V, I_D = 2.8A$	-	0.500	0.535	Ω
		$T_j = 125^\circ\text{C}$	-	1.00	-	
Gate resistance	R_G	$f = 1MHz, \text{open drain}$	-	3.0	-	Ω

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Forward Transfer Admittance	$ Y_{fs} ^{*5}$	$V_{DS} = 10\text{V}, I_D = 4.5\text{A}$	2.3	4.5	-	S
Input capacitance	C_{iss}	$V_{GS} = 0\text{V}$	-	540	-	pF
Output capacitance	C_{oss}	$V_{DS} = 25\text{V}$	-	500	-	
Reverse transfer capacitance	C_{rss}	$f = 1\text{MHz}$	-	25	-	
Turn - on delay time	$t_{d(on)}^{*5}$	$V_{DD} \approx 300\text{V}, V_{GS} = 10\text{V}$	-	20	-	ns
Rise time	t_r^{*5}	$I_D = 4.5\text{A}$	-	33	-	
Turn - off delay time	$t_{d(off)}^{*5}$	$R_L \approx 66.7\Omega$	-	37	-	
Fall time	t_f^{*5}	$R_G = 10\Omega$	-	28	-	

●Gate charge characteristics ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g^{*5}	$V_{DD} \approx 300\text{V}$	-	16.5	-	nC
Gate - Source charge	Q_{gs}^{*5}	$I_D = 9\text{A}$	-	4.5	-	
Gate - Drain charge	Q_{gd}^{*5}	$V_{GS} = 10\text{V}$	-	7.6	-	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} \approx 300\text{V}, I_D = 9\text{A}$	-	6.8	-	V

*1 Limited only by maximum channel temperature allowed.

*2 $P_w \leq 10\mu\text{s}$, Duty cycle $\leq 1\%$

*3 $L \doteq 100\text{mH}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, STARTING $T_j = 25^\circ\text{C}$

*4 $T_C = 25^\circ\text{C}$

*5 Pulsed

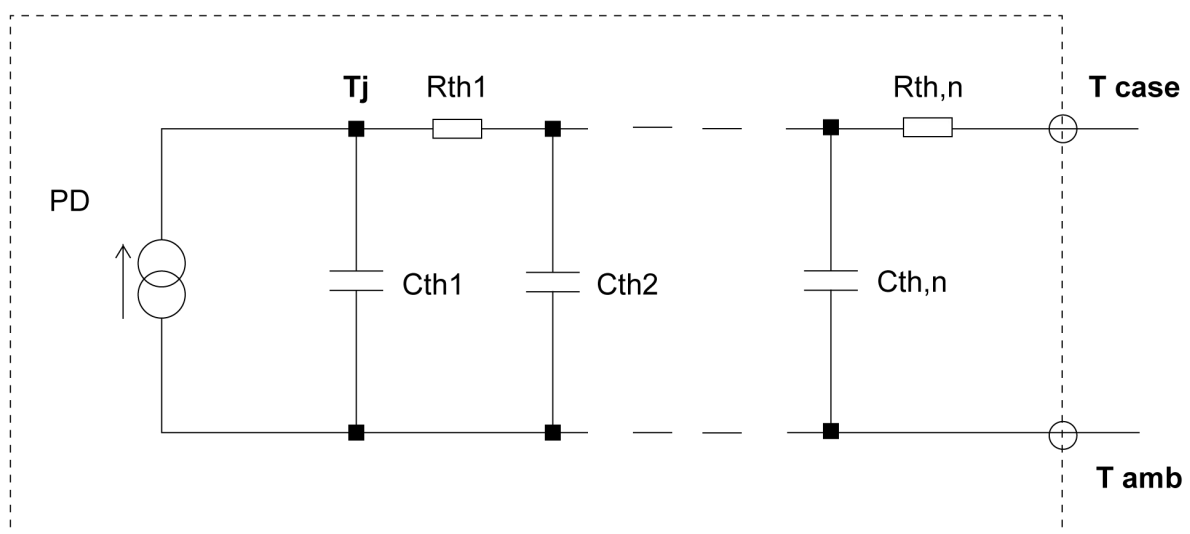
●Body diode electrical characteristics (Source-Drain) ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous forward current	I_S^{*1}	$T_C = 25^\circ\text{C}$	-	-	9	A
Pulse forward current	I_{SP}^{*2}		-	-	27	A
Forward voltage	V_{SD}^{*5}	$V_{GS} = 0\text{V}, I_S = 9.0\text{A}$	-	-	1.5	V
Reverse recovery time	t_{rr}^{*5}	$I_S = 9\text{A}$ $di/dt = 100\text{A}/\mu\text{s}$	-	345	-	ns
Reverse recovery charge	Q_{rr}^{*5}		-	3.0	-	μC
Peak reverse recovery current	I_{rm}^{*5}		-	18	-	A

●Typical transient thermal characteristics

Symbol	Value	Unit
R_{th1}	0.344	K/W
R_{th2}	1.15	
R_{th3}	2.2	

Symbol	Value	Unit
C_{th1}	0.00137	Ws/K
C_{th2}	0.0145	
C_{th3}	0.451	



● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

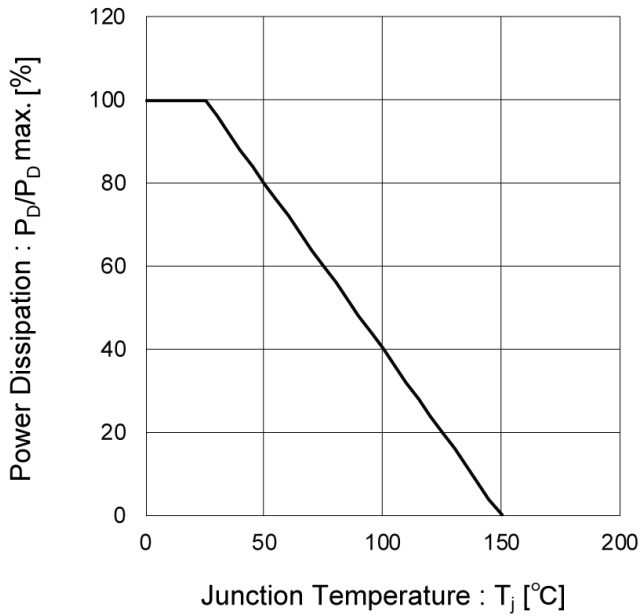


Fig.2 Maximum Safe Operating Area

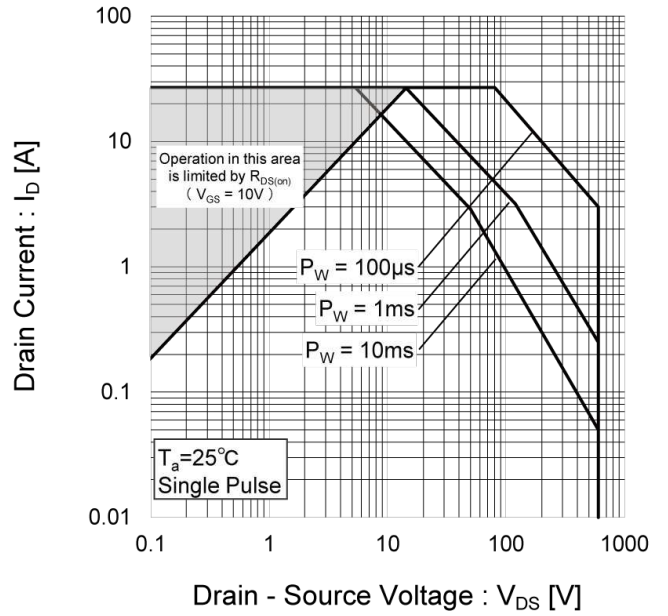
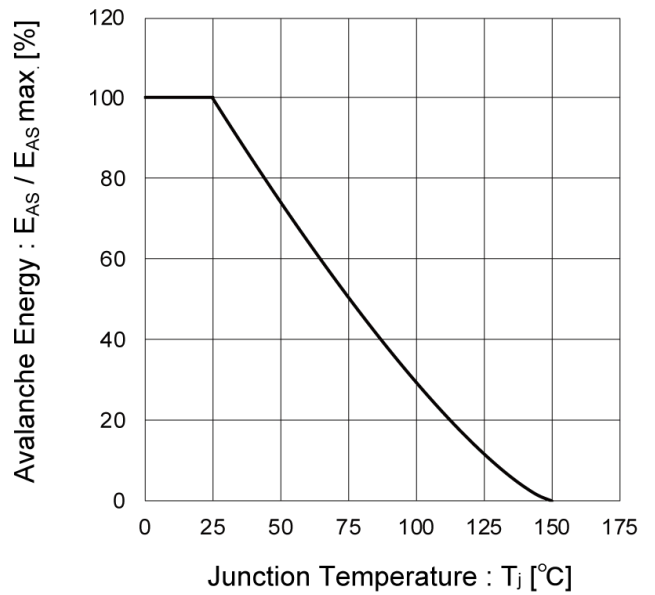


Fig.3 Avalanche Energy Derating Curve vs. Junction Temperature



● Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

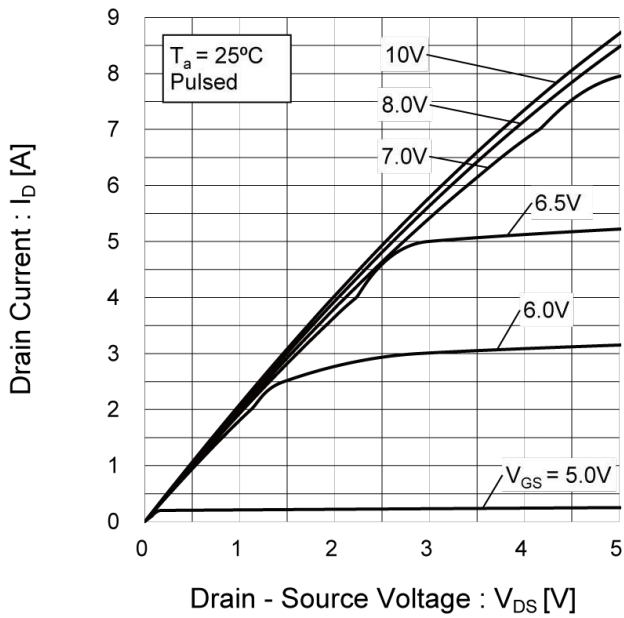
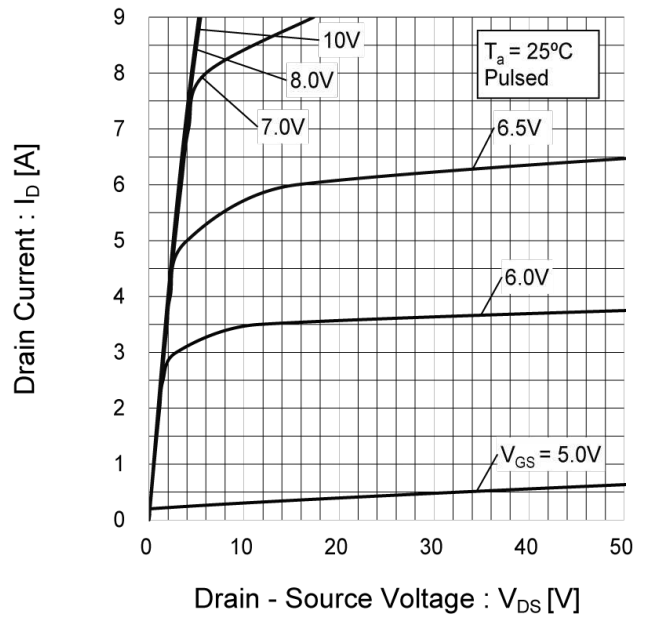


Fig.5 Typical Output Characteristics(II)



● Electrical characteristic curves

Fig.6 Breakdown Voltage vs. Junction Temperature

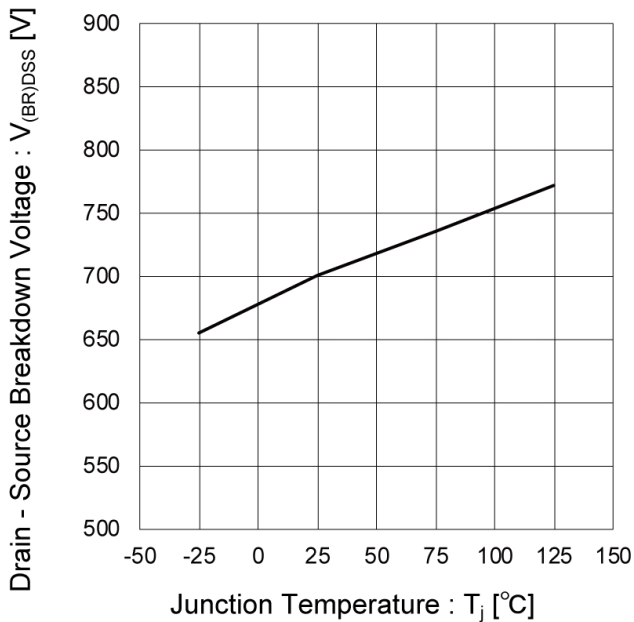


Fig.7 Typical Transfer Characteristics

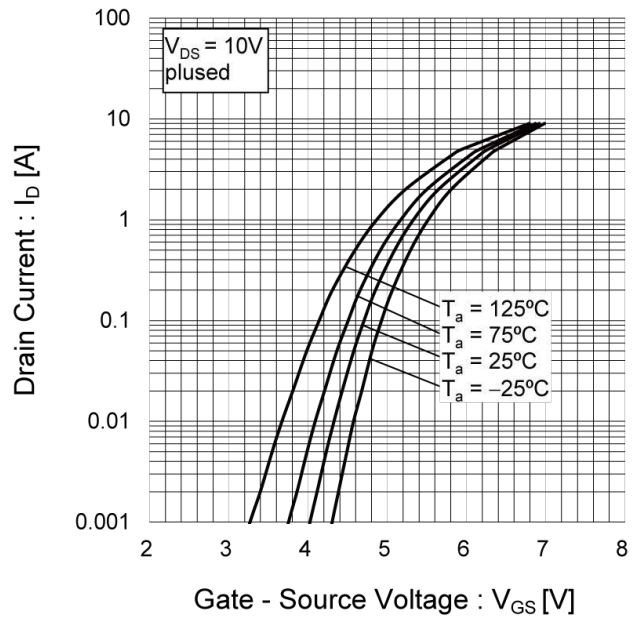


Fig.8 Gate Threshold Voltage vs. Junction Temperature

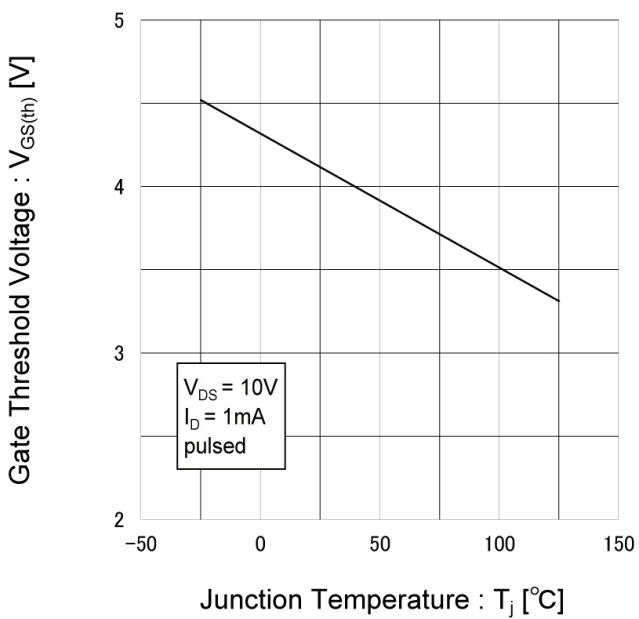
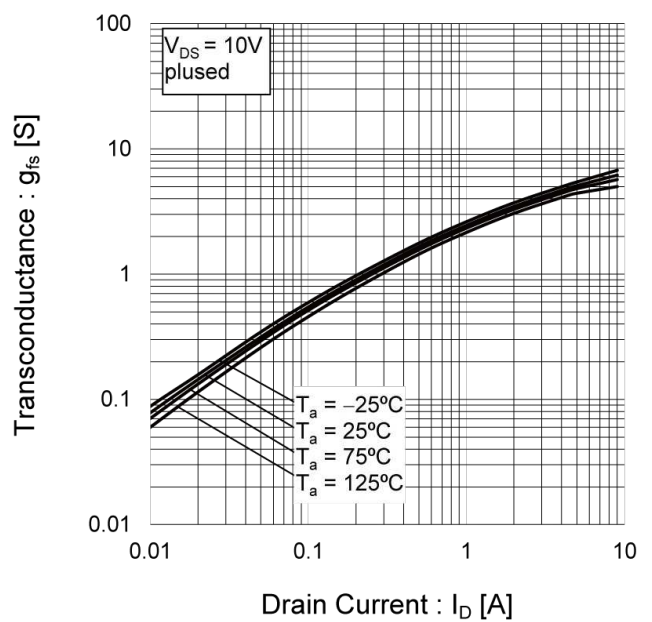


Fig.9 Forward Transfer Admittance vs. Drain Current



● Electrical characteristic curves

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

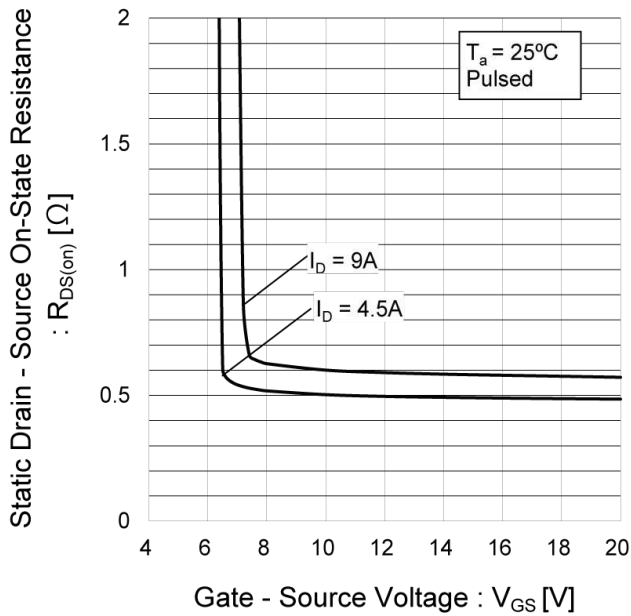


Fig.11 Static Drain - Source On - State Resistance vs. Junction Temperature

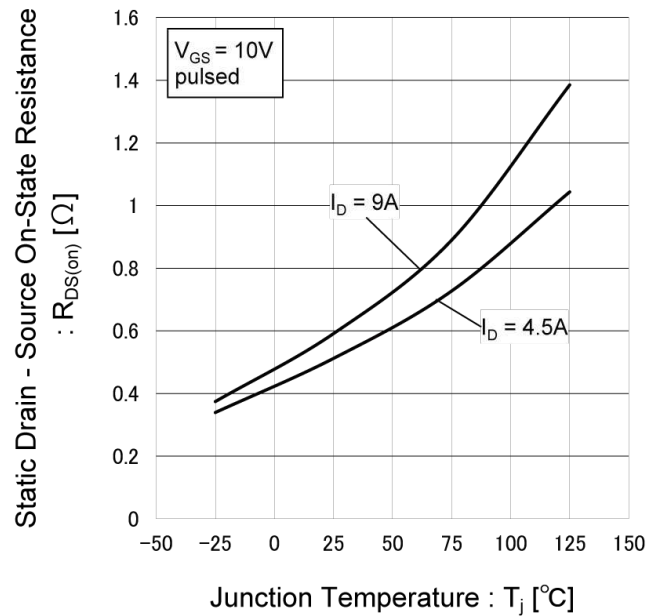
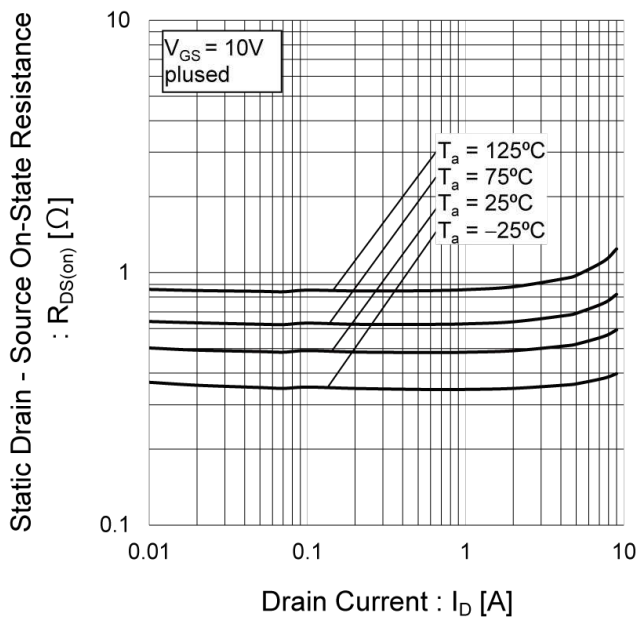


Fig.12 Static Drain - Source On - State Resistance vs. Drain Current(I)



● Electrical characteristic curves

Fig.13 Typical Capacitance vs. Drain - Source Voltage

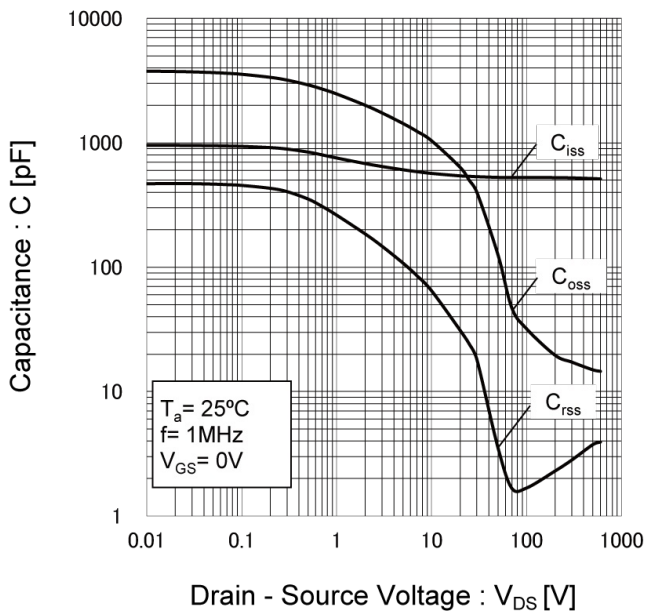


Fig.14 Switching Characteristics

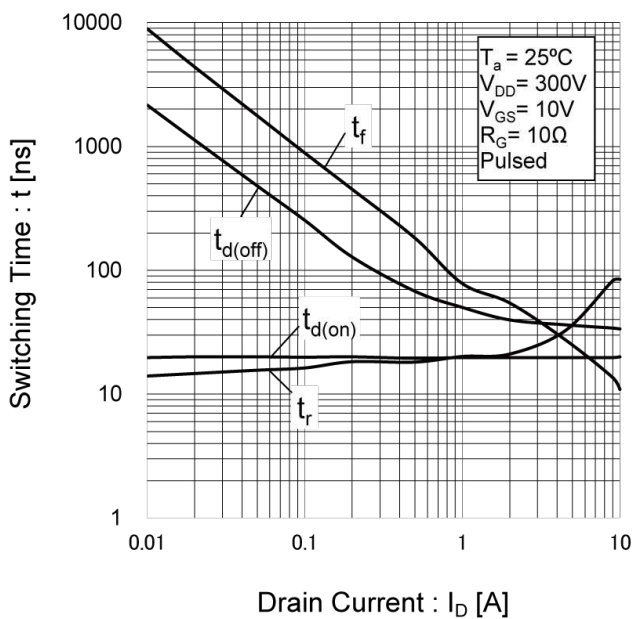
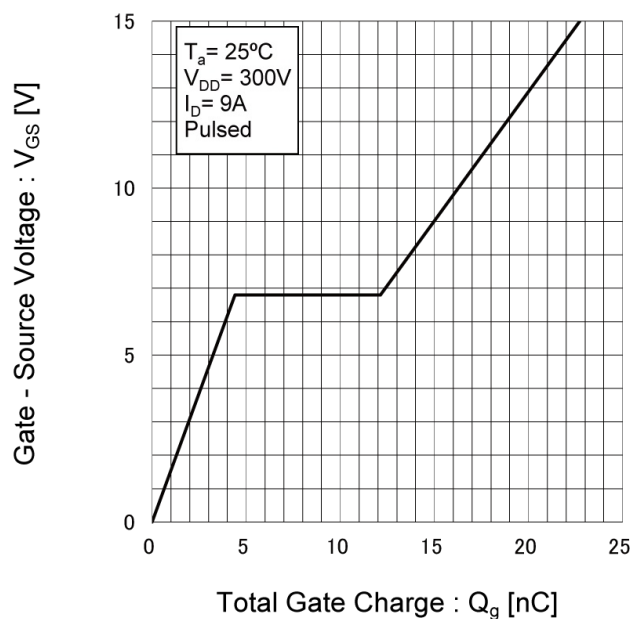


Fig.15 Dynamic Input Characteristics



● Electrical characteristic curves

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

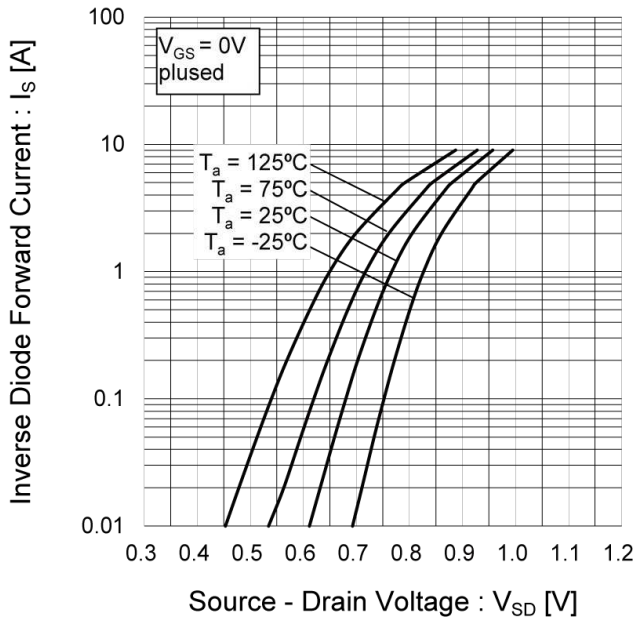
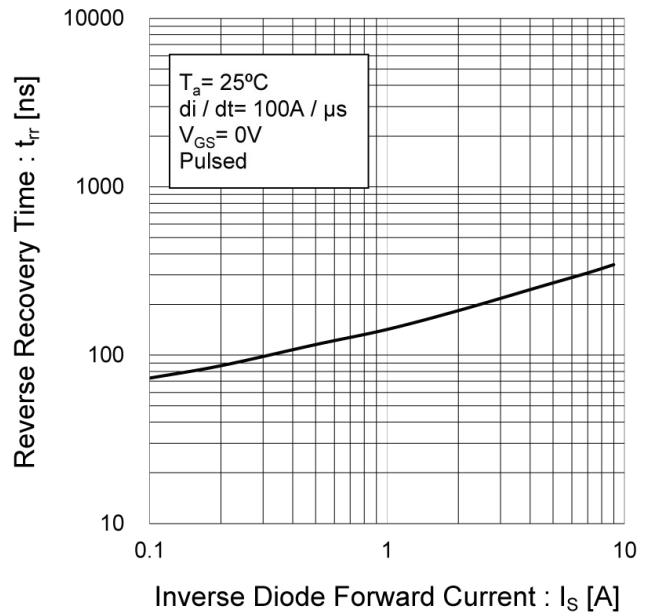


Fig.17 Reverse Recovery Time vs. Inverse Diode Forward Current



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

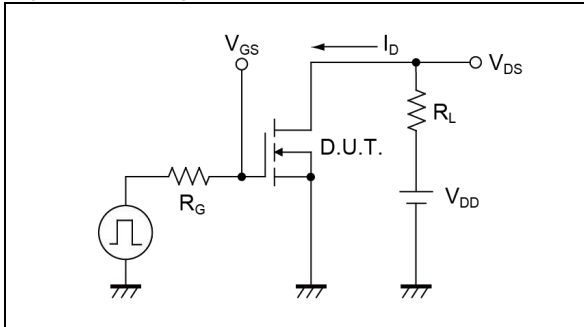


Fig.1-2 Switching Waveforms

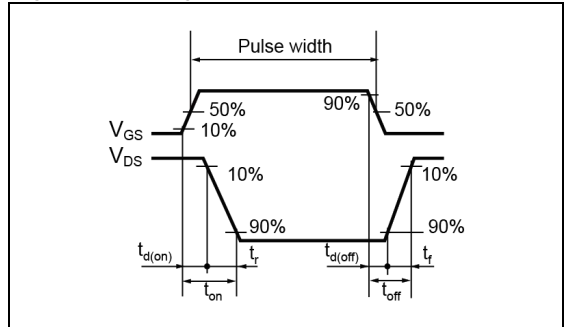


Fig.2-1 Gate Charge Measurement Circuit

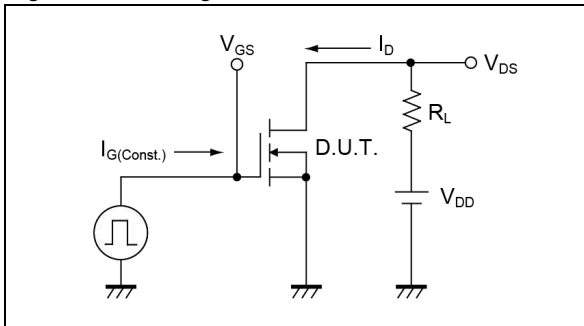


Fig.2-2 Gate Charge Waveform

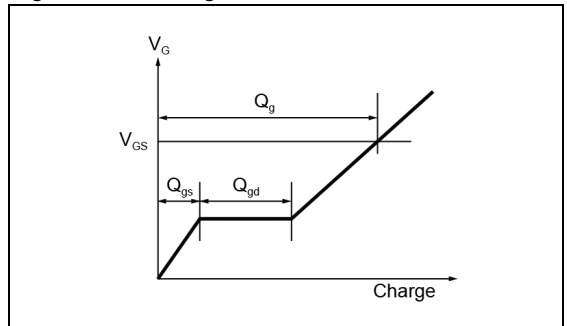


Fig.3-1 Avalanche Measurement Circuit

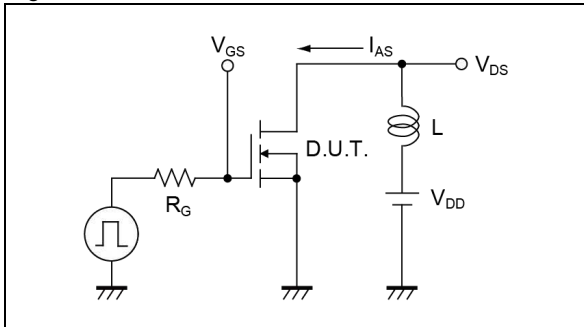


Fig.3-2 Avalanche Waveform

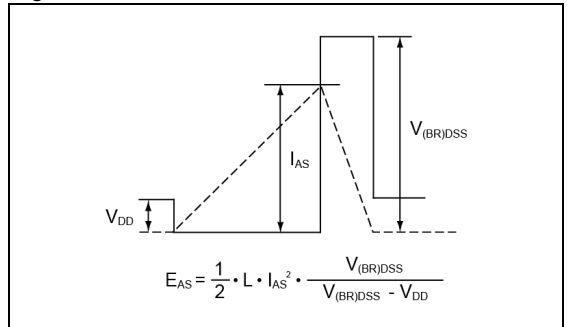


Fig.4-1 dv/dt Measurement Circuit

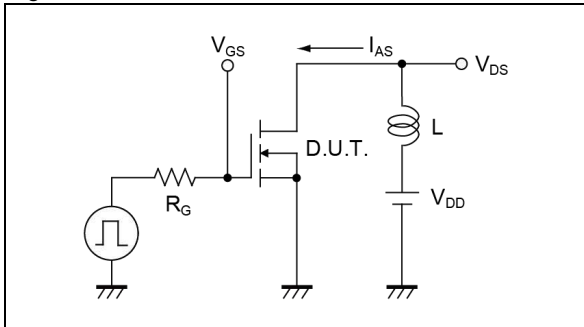


Fig.4-2 dv/dt Waveform

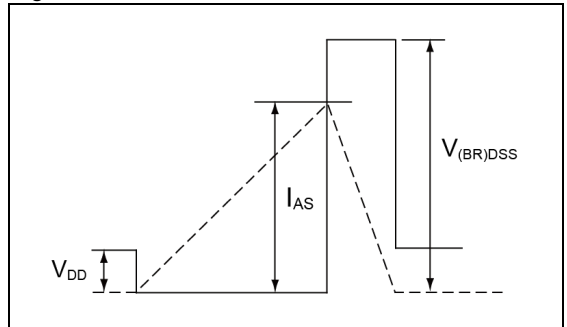


Fig.5-1 dv/dt Measurement Circuit

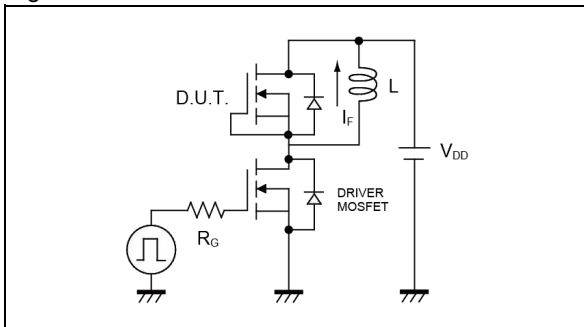
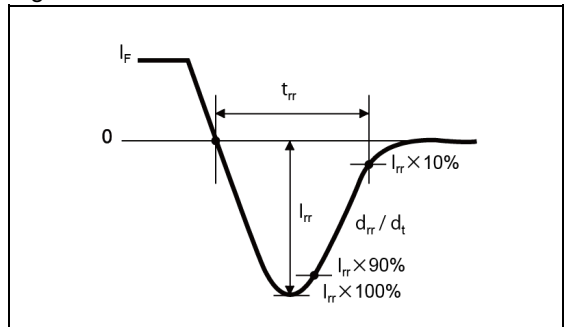
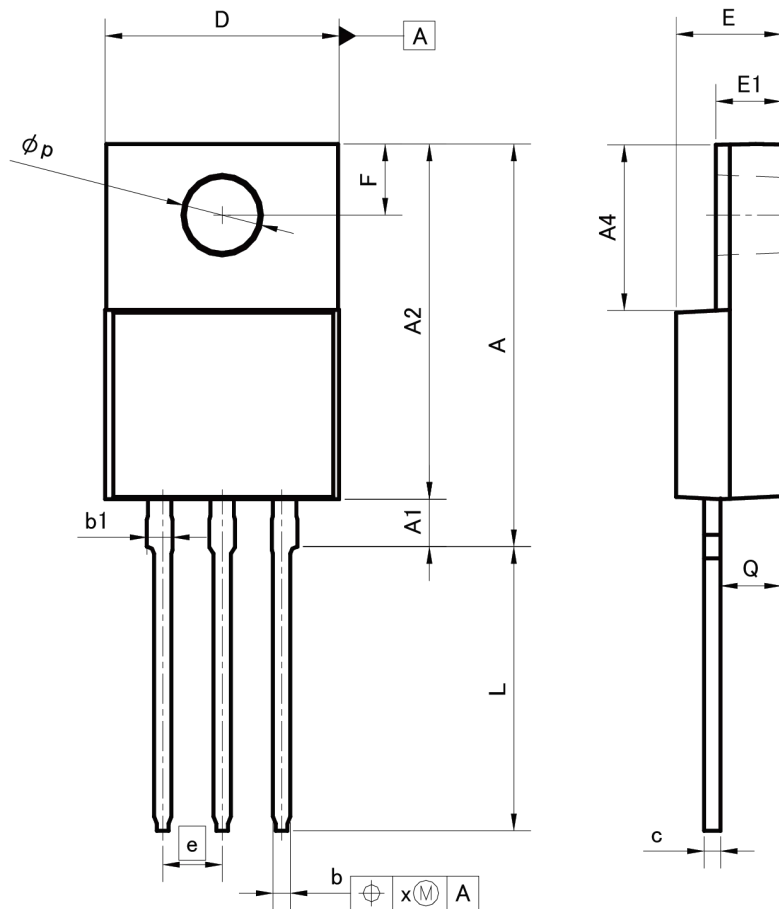


Fig.5-2 dv/dt Waveform



●Dimensions

TO-220FM



DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	16.60	17.60	0.654	0.693
A1	1.80	2.20	0.071	0.087
A2	14.80	15.40	0.583	0.606
A4	6.80	7.20	0.268	0.283
b	0.70	0.85	0.028	0.033
b1	1.10	1.50	0.043	0.059
c	0.70	0.85	0.028	0.033
D	9.90	10.30	0.390	0.406
E	4.40	4.80	0.173	0.189
e	2.54		0.100	
E1	2.70	3.00	0.106	0.118
F	2.80	3.20	0.110	0.126
L	11.50	12.50	0.453	0.492
p	3.00	3.40	0.118	0.134
Q	2.10	3.10	0.083	0.122
x	-	0.38	-	0.015

Dimension in mm/inches

Notes

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R6009KNX - Web Page

[Distribution Inventory](#)

Part Number	R6009KNX
Package	TO-220FM
Unit Quantity	500
Minimum Package Quantity	500
Packing Type	Bulk
Constitution Materials List	inquiry
RoHS	Yes