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.

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R6024ENZ1

Nch 600V 24A Power MOSFET Data Sheet

V_{DSS}	600V
$R_{DS(on)}$ (Max.)	0.165Ω
I_D	24A
P_D	120W

●Outline

TO-247

●Features

1) Low on-resistance.

2) Fast switching speed.

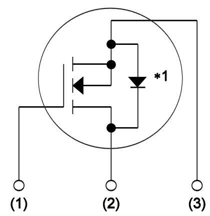
3) Gate-source voltage (V_{GSS}) guaranteed to be ±20V.

4) Drive circuits can be simple.

5) Parallel use is easy.

6) Pb-free lead plating ; RoHS compliant

●Inner circuit



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

∗1 BODY DIODE

●Application

Switching Power Supply

●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	450
	Taping code	C9
	Marking	R6024ENZ1

●Absolute maximum ratings (T_a = 25°C)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	600	V
Continuous drain current	T_c = 25°C	I_D *1	±24	A
	T_c = 100°C	I_D *1	±13.0	A
Pulsed drain current		$I_{D,pulse}$ *2	±72	A
Gate - Source voltage		V_{GSS}	±20	V
Avalanche energy, single pulse		E_{AS} *3	497	mJ
Avalanche energy, repetitive		E_{AR} *3	0.75	mJ
Avalanche current, repetitive		I_{AR}	4.1	A
Power dissipation (T_c = 25°C)		P_D	120	W
Junction temperature		T_j	150	°C
Range of storage temperature		T_{stg}	–55 to +150	°C
Reverse diode dv/dt		dv/dt *4	15	V/ns

●Absolute maximum ratings

Parameter	Symbol	Conditions	Values	Unit
Drain - Source voltage slope	dv/dt	V_{DS} = 480V T_j = 25°C	50	V/ns

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	R_{thJC}	-	-	1.04	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	30	°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	600	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 600V, V_{GS} = 0V T_j = 25°C T_j = 125°C	- -	0.1 -	100 1000	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS\ (th)}$	V_{DS} = 10V, I_D = 1mA	2	-	4	V
Static drain - source on - state resistance	$R_{DS(on)}$ *5	V_{GS} = 10V, I_D = 11.3A T_j = 25°C T_j = 125°C	- -	0.150 0.320	0.165 -	Ω
Gate input resistance	R_G	f = 1MHz, open drain	-	6.1	-	Ω

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs} *5	V_{DS} = 10V, I_D = 12A	6.5	13.0	-	S
Input capacitance	C_{iss}	V_{GS} = 0V	-	1650	-	pF
Output capacitance	C_{oss}	V_{DS} = 25V	-	1350	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	160	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS} = 0V V_{DS} = 0V to 480V	-	66	-	pF
Effective output capacitance, time related	$C_{o(tr)}$		-	314	-	
Turn - on delay time	$t_{d(on)}$ *5	V_{DD} ≃ 300V, V_{GS} = 10V	-	35	-	ns
Rise time	t_r *5	I_D = 12A	-	50	-	
Turn - off delay time	$t_{d(off)}$ *5	R_L = 27.4Ω	-	180	-	
Fall time	t_f *5	R_G = 10Ω	-	50	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *5	V_{DD} ≃ 300V	-	70	-	nC
Gate - Source charge	Q_{gs} *5	I_D = 24A	-	10	-	
Gate - Drain charge	Q_{gd} *5	V_{GS} = 10V	-	35	-	
Gate plateau voltage	$V_{(plateau)}$	V_{DD} ≃ 300V, I_D = 24A	-	6.4	-	V

*1 Limited only by maximum temperature allowed.

*2 $P_W \leq 10\mu s$, Duty cycle ≤ 1%

*3 I_D = 4.1A, V_{DD} = 50V

*4 Reference measurement circuits Fig.5-1.

*5 Pulsed

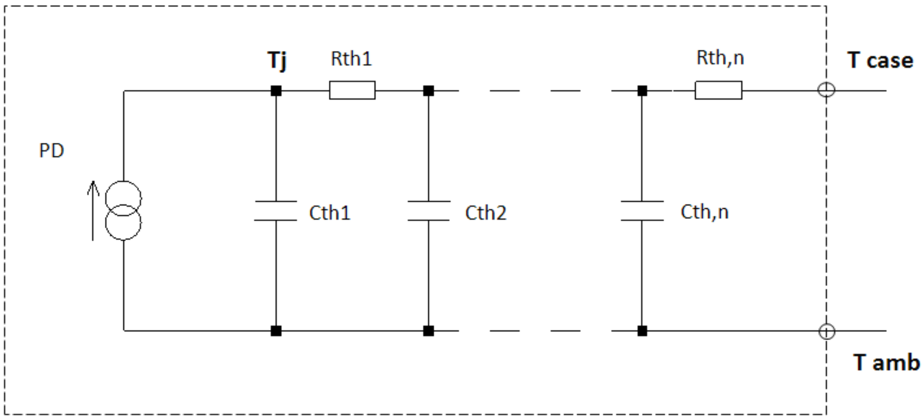
●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	T_c = 25°C	-	-	24	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	72	A
Forward voltage	V_{SD} *5	V_{GS} = 0V, I_S = 24A	-	-	1.5	V
Reverse recovery time	t_{rr} *5	I_S = 24A di/dt = 100A/μs	-	625	-	ns
Reverse recovery charge	Q_{rr} *5		-	13.3	-	μC
Peak reverse recovery current	I_{rrm} *5		-	42	-	A

●Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	0.237	K/W
R_{th2}	0.430	
R_{th3}	0.250	

Symbol	Value	Unit
C_{th1}	0.0115	Ws/K
C_{th2}	0.264	
C_{th3}	14.2	



●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

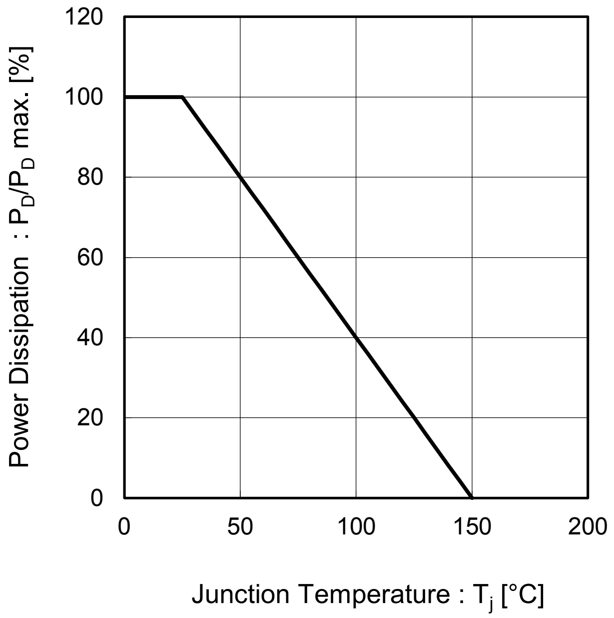


Fig.2 Normalized Transient Thermal Resistance vs. Pulse Width

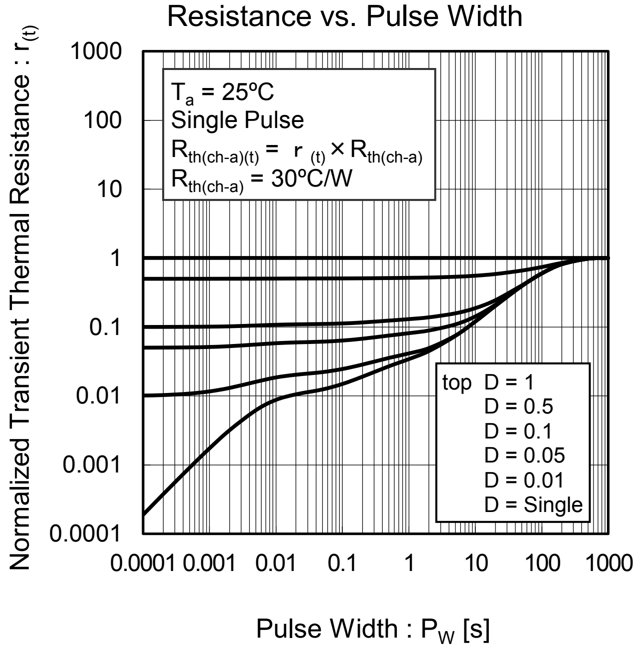
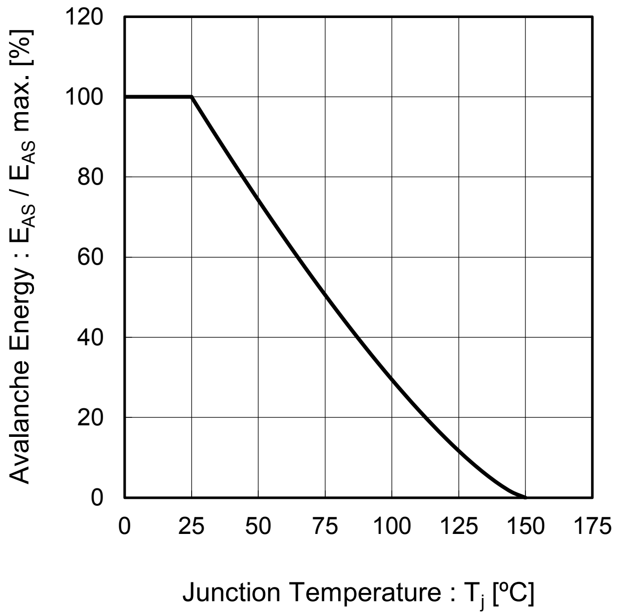


Fig.3 Avalanche Energy Derating Curve vs Junction Temperature



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

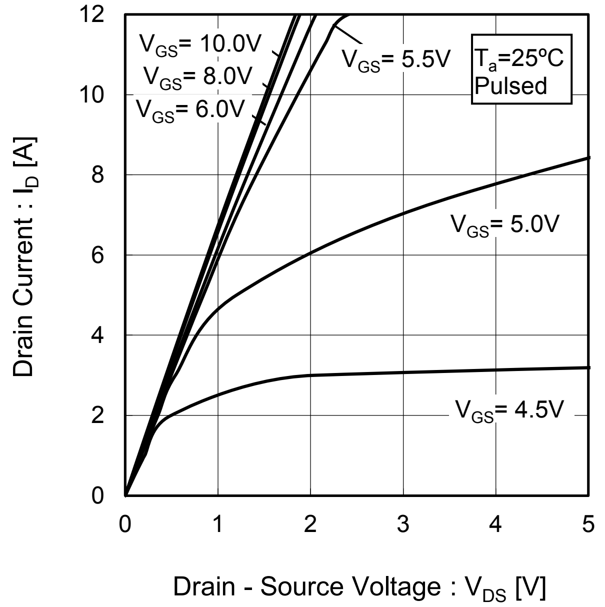


Fig.5 Typical Output Characteristics(II)

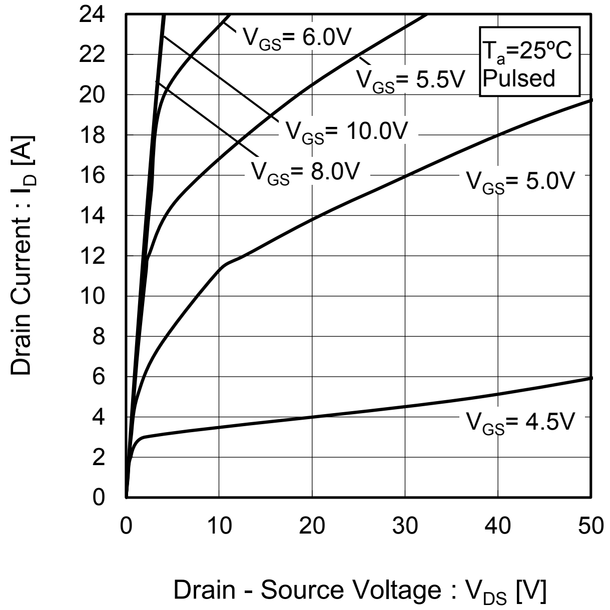


Fig.6 T_j = 150°C Typical Output Characteristics(I)

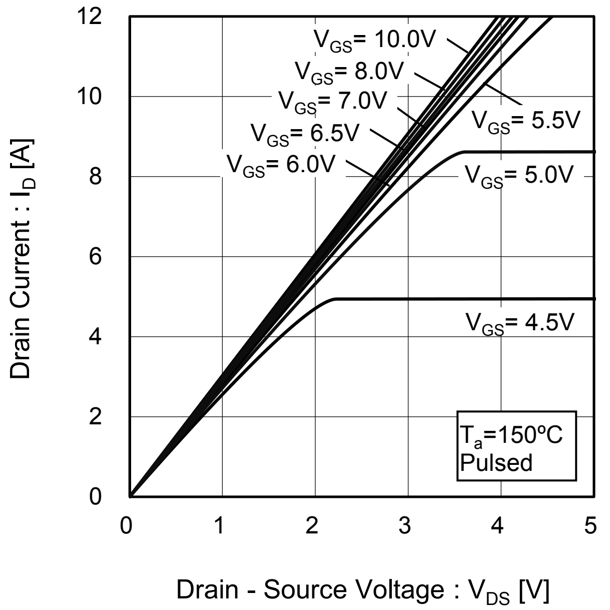
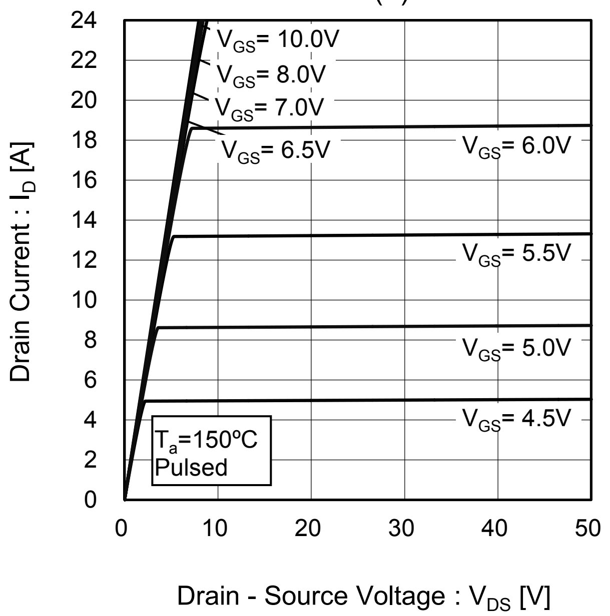
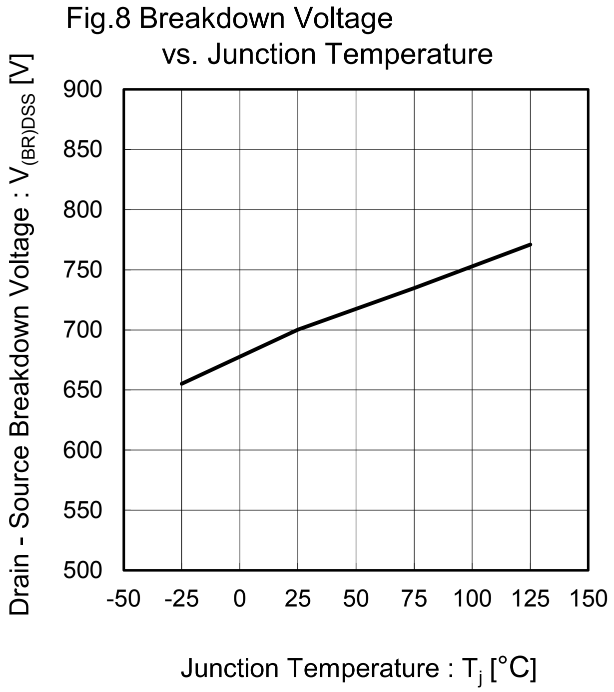
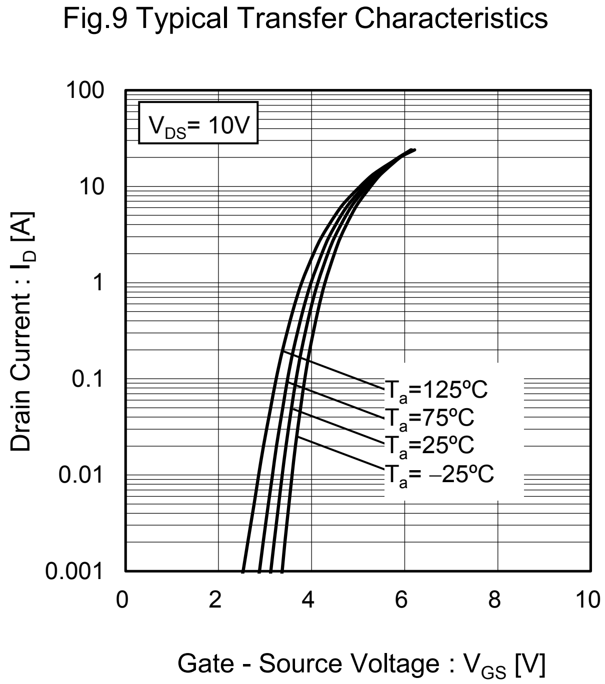


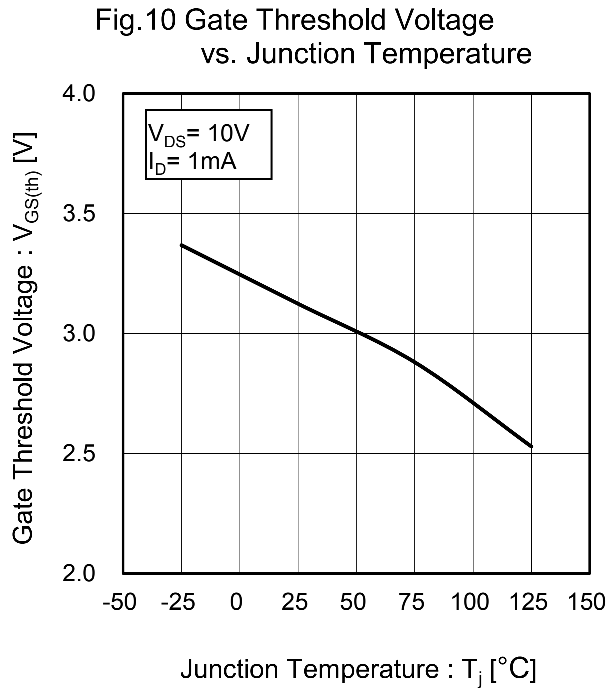
Fig.7 T_j = 150°C Typical Output Characteristics(II)

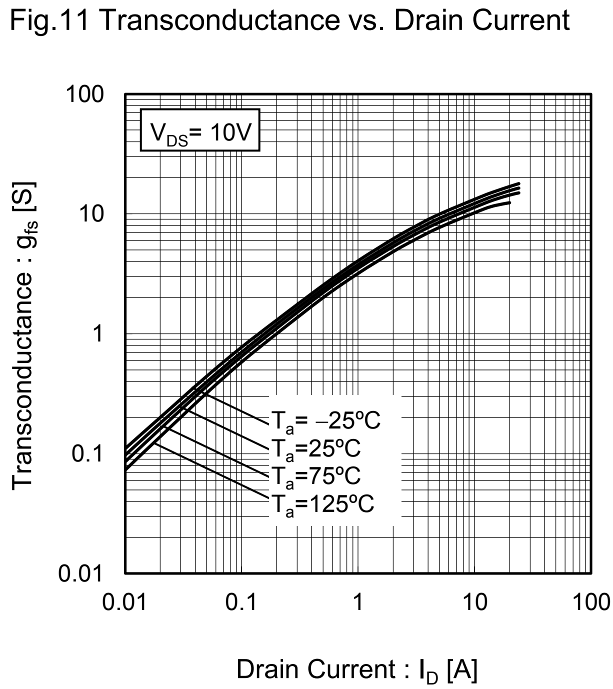


●**Electrical characteristic curves**









●Electrical characteristic curves

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

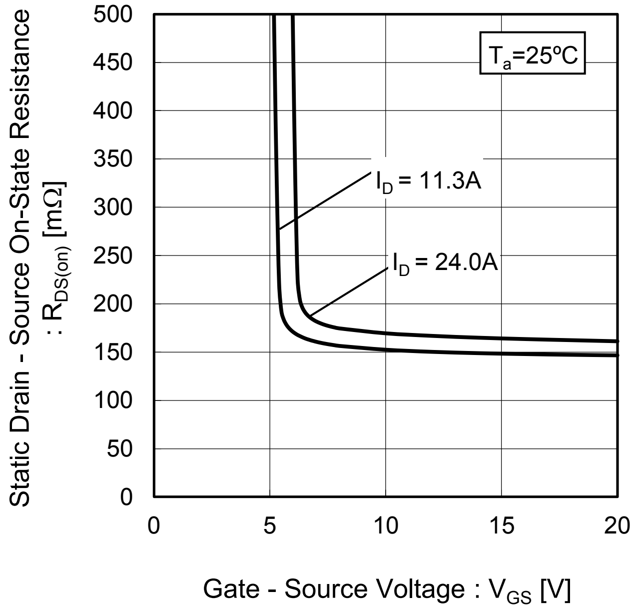


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature

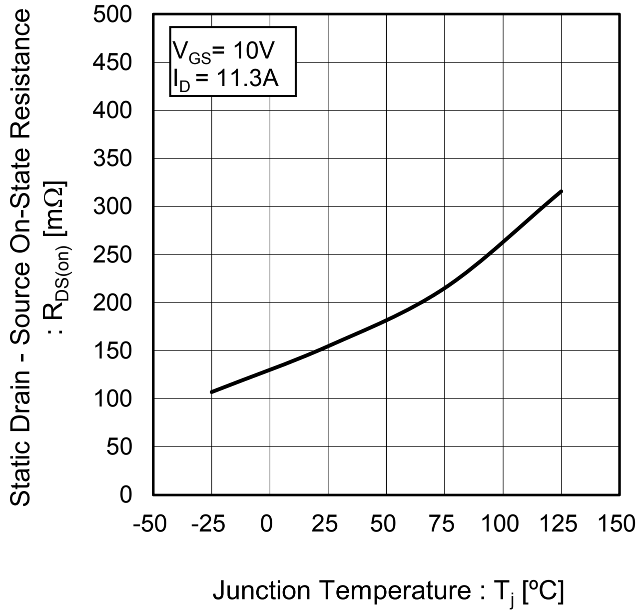


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current

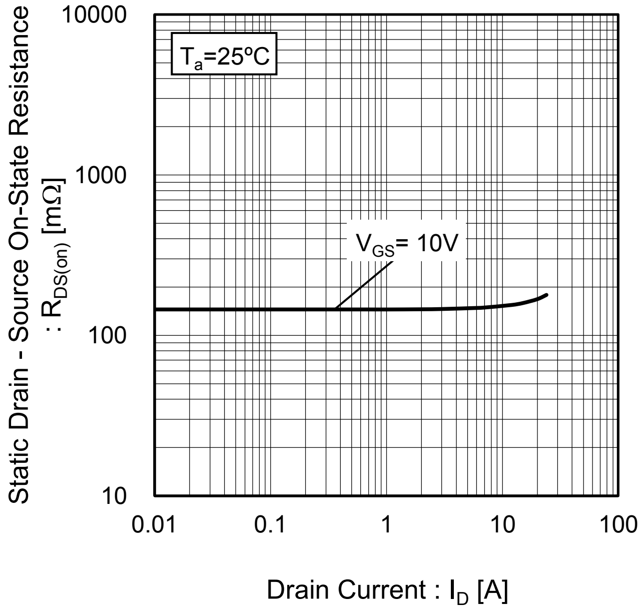
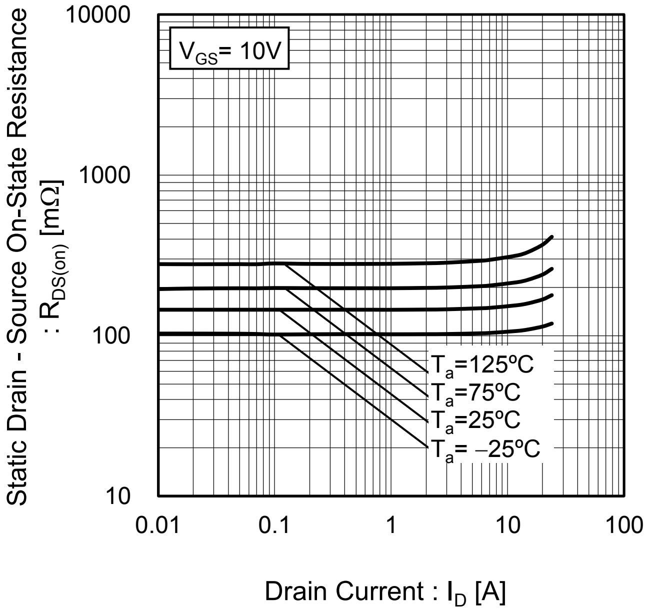


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

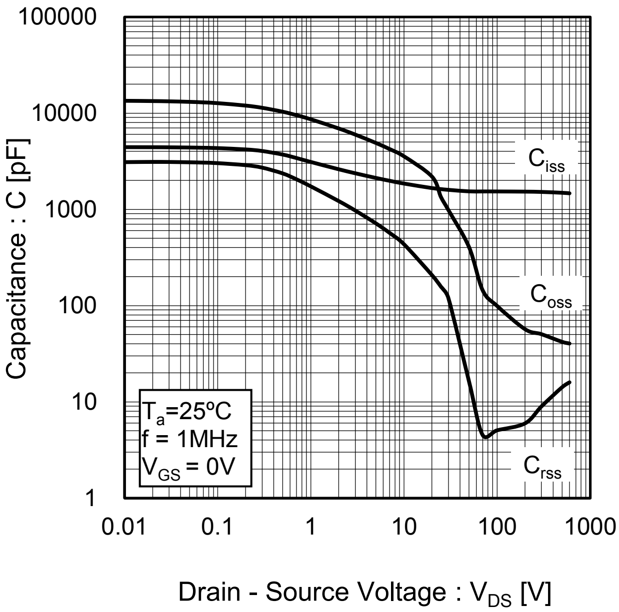


Fig.17 Coss Stored Energy

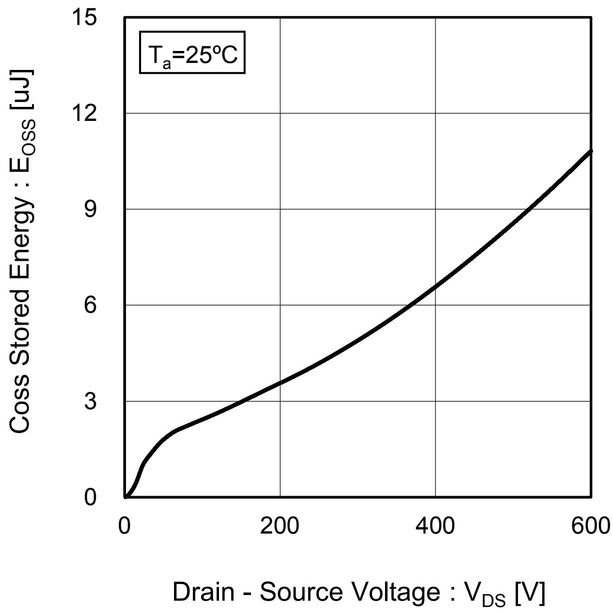


Fig.18 Switching Characteristics

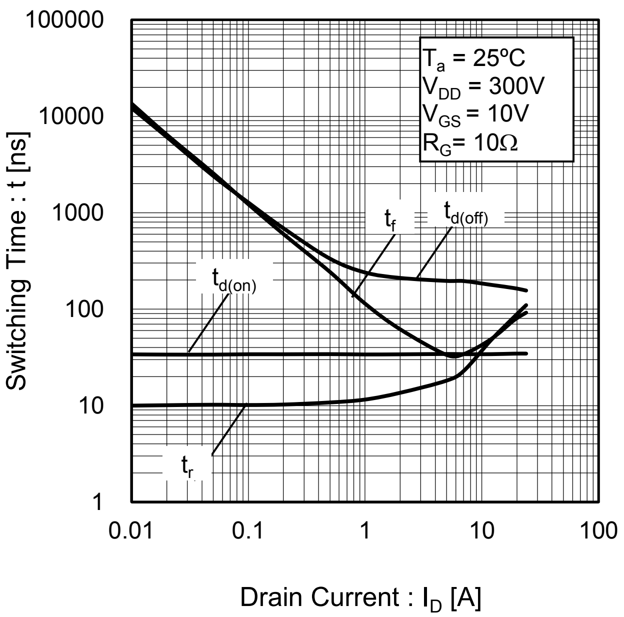
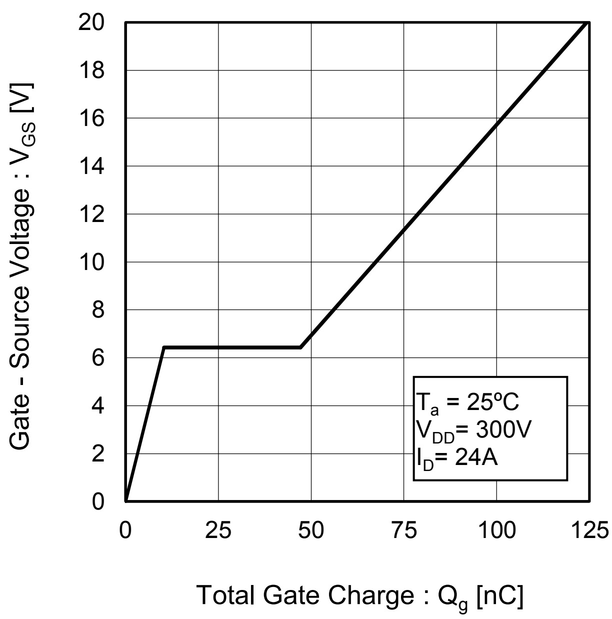


Fig.19 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.20 Inverse Diode Forward Current vs. Source - Drain Voltage

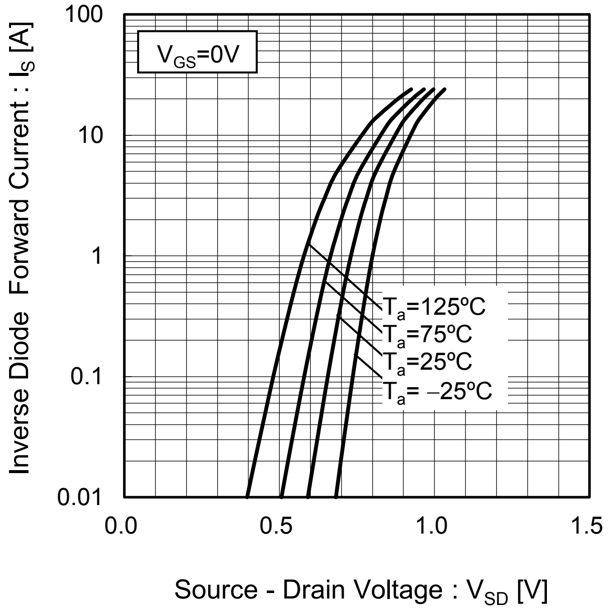
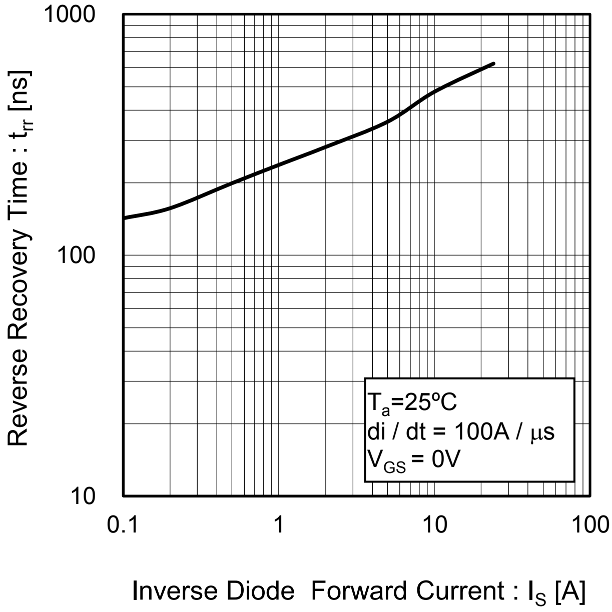


Fig.21 Reverse Recovery Time vs.Inverse Diode Forward Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

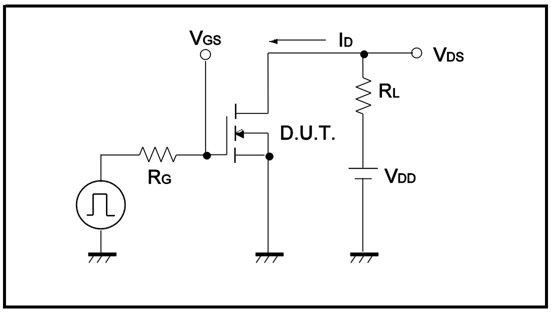


Fig.1-2 Switching Waveforms

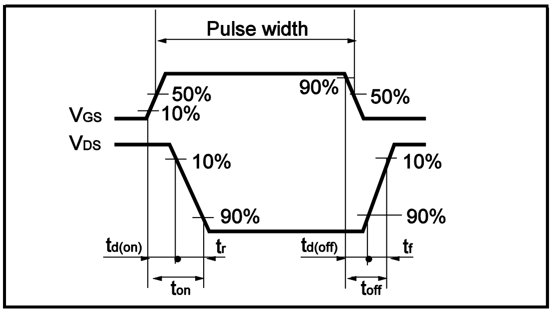


Fig.2-1 Gate Charge Measurement Circuit

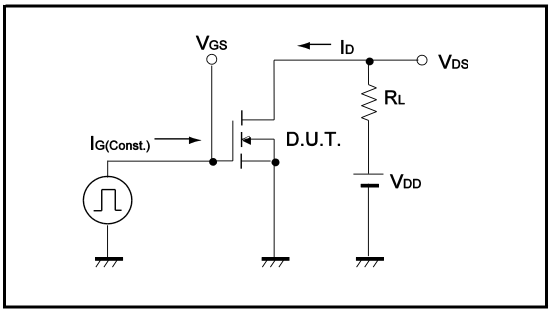


Fig.2-2 Gate Charge Waveform

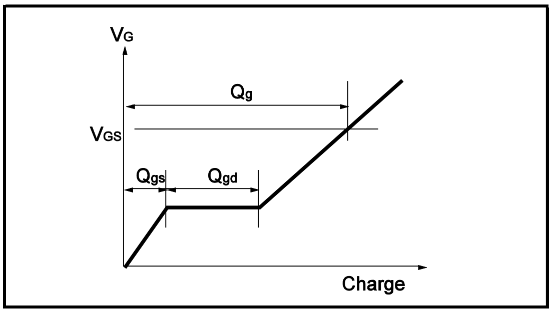


Fig.3-1 Avalanche Measurement Circuit

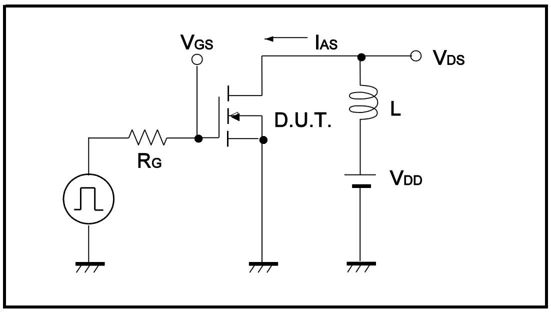


Fig.3-2 Avalanche Waveform

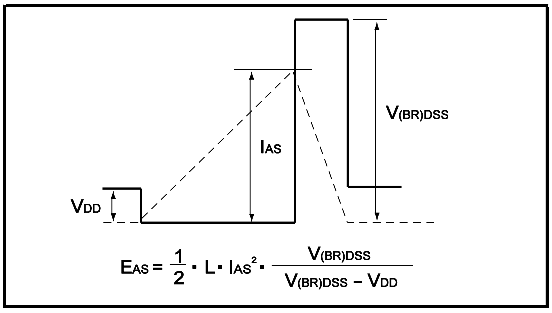


Fig.4-1 dv/dt Measurement Circuit

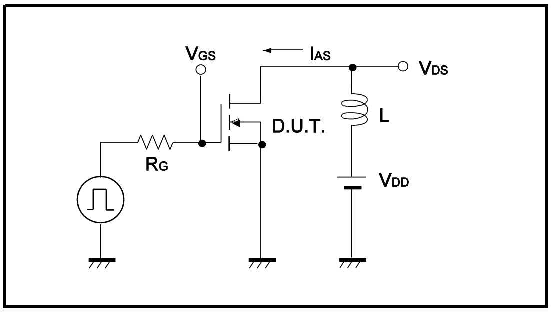


Fig.4-2 dv/dt Waveform

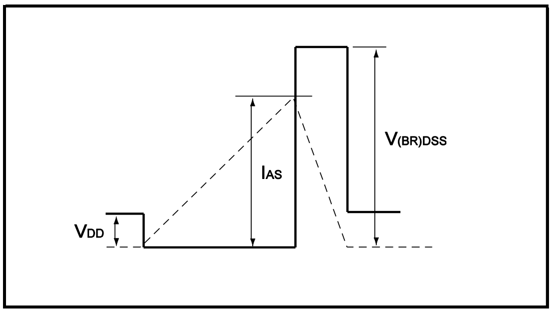


Fig.5-1 di/dt Measurement Circuit

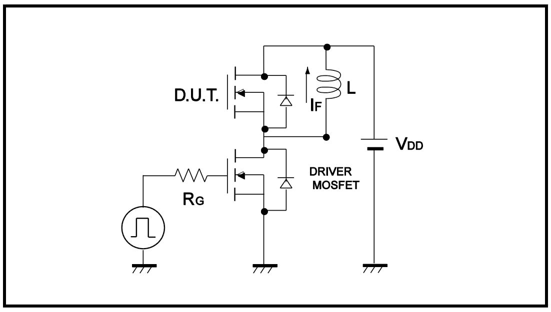
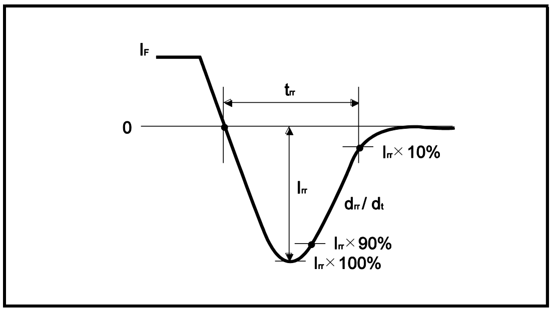
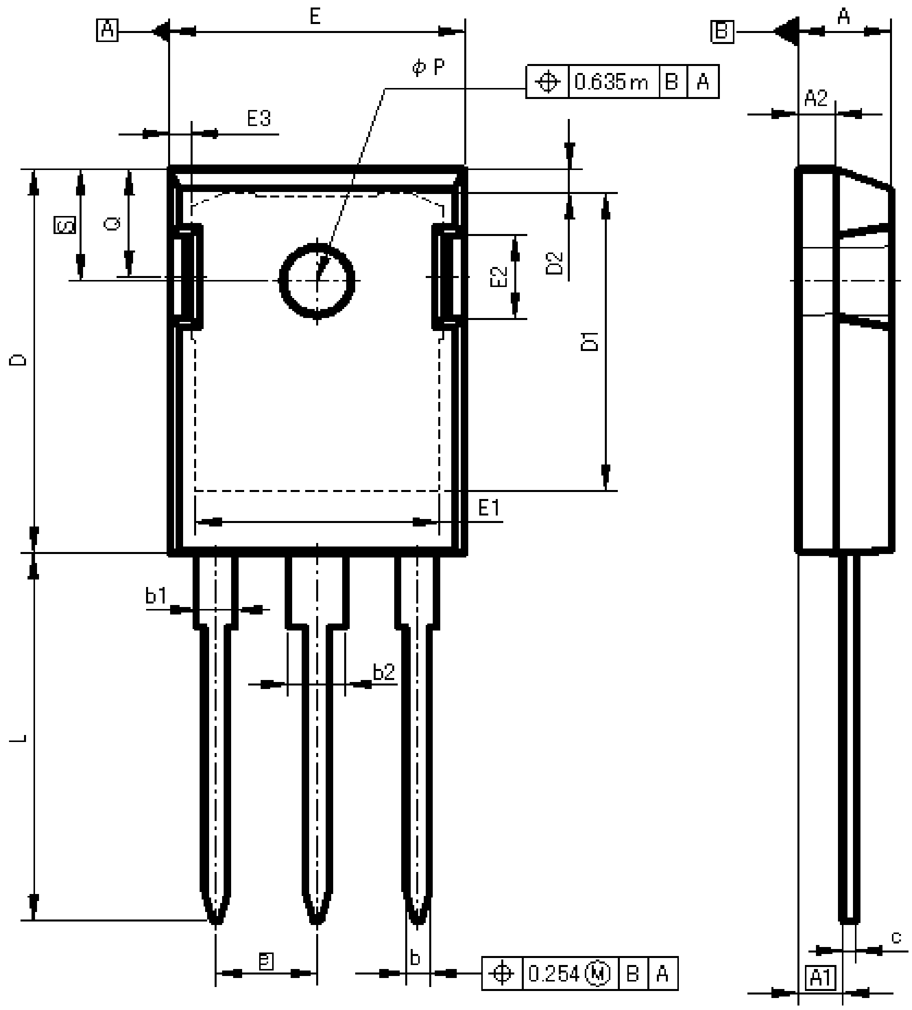


Fig.5-2 di/dt Waveform



●**Dimensions** (Unit : mm)

TO-247



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<tr><td>A1</td><td>2.29</td><td>2.54</td><td>0.090</td><td>0.100</td></tr>
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<tr><td>b</td><td>1.14</td><td>1.40</td><td>0.045</td><td>0.055</td></tr>
<tr><td>b1</td><td>1.91</td><td>2.20</td><td>0.075</td><td>0.087</td></tr>
<tr><td>b2</td><td>2.92</td><td>3.20</td><td>0.115</td><td>0.126</td></tr>
<tr><td>c</td><td>0.61</td><td>0.80</td><td>0.024</td><td>0.031</td></tr>
<tr><td>D</td><td>20.80</td><td>21.34</td><td>0.819</td><td>0.840</td></tr>
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<tr><td>E</td><td>15.75</td><td>16.13</td><td>0.620</td><td>0.635</td></tr>
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<tr><td>N</td><td colspan="2">3.00</td><td colspan="2">3.000</td></tr>
<tr><td>L</td><td>19.81</td><td>20.57</td><td>0.780</td><td>0.810</td></tr>
<tr><td>L1</td><td>3.81</td><td>4.32</td><td>0.150</td><td>0.170</td></tr>
<tr><td>Φ P</td><td>3.55</td><td>3.65</td><td>0.140</td><td>0.144</td></tr>
<tr><td>Q</td><td>5.59</td><td>6.20</td><td>0.220</td><td>0.244</td></tr>
<tr><td>S</td><td colspan="2">6.15</td><td colspan="2">0.240</td></tr>
</table>

Dimension in mm / inches

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3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
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ROHM SEMICONDUCTOR

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