

**FEATURES**

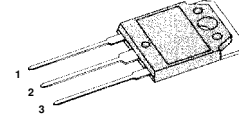
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- 150°C Operating Temperature
- Lower Leakage Current : 10 μA (Max.) @  $V_{DS} = -150V$
- Lower  $R_{DS(ON)}$  : 0.140 Ω (Typ.)

$$BV_{DSS} = -150 V$$

$$R_{DS(on)} = 0.2 \Omega$$

$$I_D = -18 A$$

**TO-3P**



1.Gate 2. Drain 3. Source

**Absolute Maximum Ratings**

Symbol	Characteristic	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	-150	V
$I_D$	Continuous Drain Current ( $T_C=25^\circ C$ )	-18	A
	Continuous Drain Current ( $T_C=100^\circ C$ )	-11.5	
$I_{DM}$	Drain Current-Pulsed ①	-72	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy ②	1215	mJ
$I_{AR}$	Avalanche Current ①	-18	A
$E_{AR}$	Repetitive Avalanche Energy ①	20.4	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-5.0	V/ns
$P_D$	Total Power Dissipation ( $T_C=25^\circ C$ )	204	W
	Linear Derating Factor	1.63	
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	- 55 to +150	°C
$T_L$	Maximum Lead Temp. for Soldering Purposes, 1/8 " from case for 5-seconds	300	

**Thermal Resistance**

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	0.61	°C/W
$R_{\theta CS}$	Case-to-Sink	0.24	--	
$R_{\theta JA}$	Junction-to-Ambient	--	40	

## Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	-150	--	--	V	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA
ΔBV/ΔT <sub>J</sub>	Breakdown Voltage Temp. Coeff.	--	-0.16	--	V/°C	I <sub>D</sub> =-250μA <b>See Fig 7</b>
V <sub>GS(th)</sub>	Gate Threshold Voltage	-2.0	--	-4.0	V	V <sub>DS</sub> =-5V, I <sub>D</sub> =-250μA
I <sub>GSS</sub>	Gate-Source Leakage , Forward	--	--	-100	nA	V <sub>GS</sub> =-30V
	Gate-Source Leakage , Reverse	--	--	100		V <sub>GS</sub> =30V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	--	--	-10	μA	V <sub>DS</sub> =-150V
		--	--	-100		V <sub>DS</sub> =-120V, T <sub>C</sub> =125°C
R <sub>DS(on)</sub>	Static Drain-Source On-State Resistance	--	0.14	0.2	Ω	V <sub>GS</sub> =-10V, I <sub>D</sub> =-9.0A ④
g <sub>fs</sub>	Forward Transconductance	--	11	--	∅	V <sub>DS</sub> =-40V, I <sub>D</sub> =-9.0A ④
C <sub>iss</sub>	Input Capacitance	--	2290	3000	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =-25V, f = 1MHz <b>See Fig 5</b>
C <sub>oss</sub>	Output Capacitance	--	400	600		
C <sub>rss</sub>	Reverse Transfer Capacitance	--	200	300		
t <sub>d(on)</sub>	Turn-On Delay Time	--	20	45	ns	V <sub>DD</sub> =-75V, I <sub>D</sub> =-18A, R <sub>G</sub> =6.2Ω <b>See Fig 13</b> ④ ⑤
t <sub>r</sub>	Rise Time	--	40	90		
t <sub>d(off)</sub>	Turn-Off Delay Time	--	80	170		
t <sub>f</sub>	Fall Time	--	40	90		
Q <sub>g</sub>	Total Gate Charge	--	100	130	nC	V <sub>DS</sub> =-120V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-18A <b>See Fig 6 &amp; Fig 12</b> ④ ⑤
Q <sub>gs</sub>	Gate-Source Charge	--	20	--		
Q <sub>gd</sub>	Gate-Drain( " Miller " ) Charge	--	40	--		

## Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I <sub>S</sub>	Continuous Source Current	--	--	-18	A	Integral reverse pn-diode in the MOSFET
I <sub>SM</sub>	Pulsed-Source Current ①	--	--	-72		
V <sub>SD</sub>	Diode Forward Voltage ④	--	--	-5.0	V	T <sub>J</sub> =25°C, I <sub>S</sub> =-18A, V <sub>GS</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	--	200	--	ns	T <sub>J</sub> =25°C, I <sub>F</sub> =-18A
Q <sub>rr</sub>	Reverse Recovery Charge	--	1.5	--	μC	di <sub>F</sub> /dt=100A/μs ④

### Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② L=5mH, I<sub>AS</sub>=-18A, V<sub>DD</sub>=-50V, R<sub>G</sub>=27Ω, Starting T<sub>J</sub>=25°C
- ③ I<sub>SD</sub> ≤ -18A, di/dt ≤ 450A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub>=25°C
- ④ Pulse Test : Pulse Width = 250μs, Duty Cycle ≤ 2%
- ⑤ Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

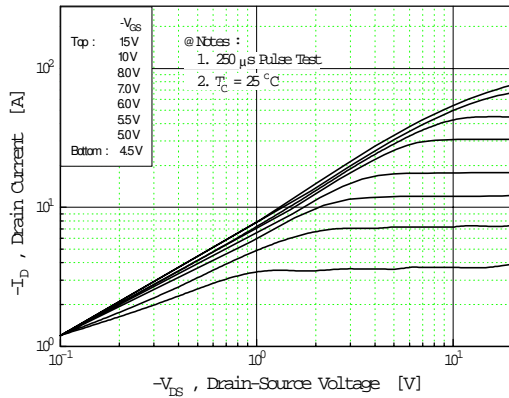


Fig 2. Transfer Characteristics

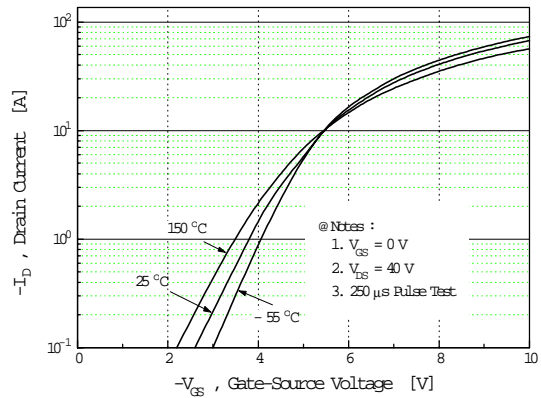


Fig 3. On-Resistance vs. Drain Current

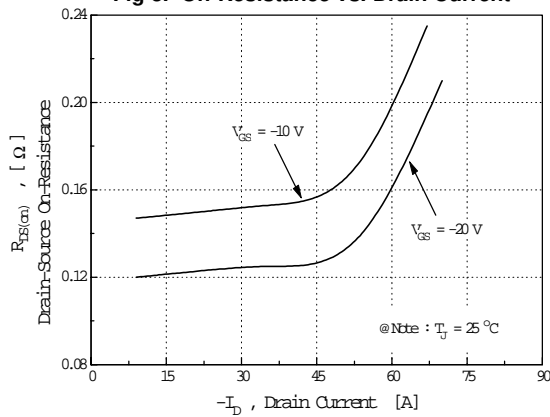


Fig 4. Source-Drain Diode Forward Voltage

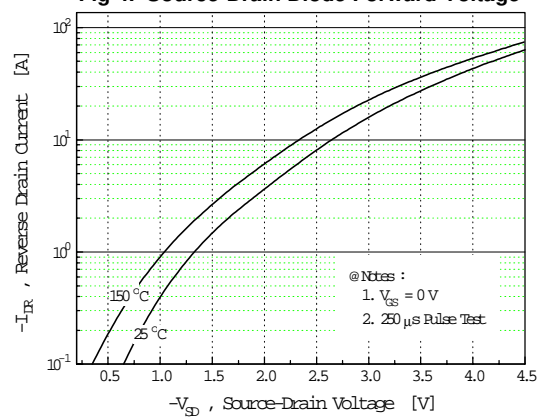


Fig 5. Capacitance vs. Drain-Source Voltage

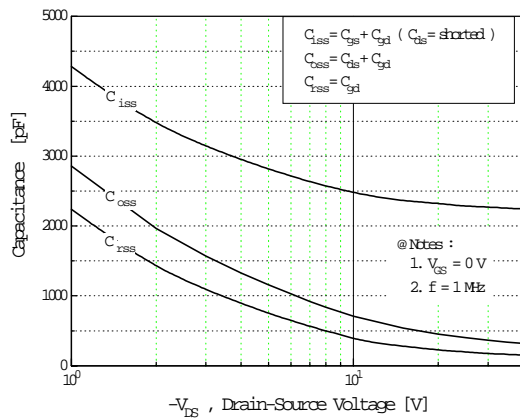
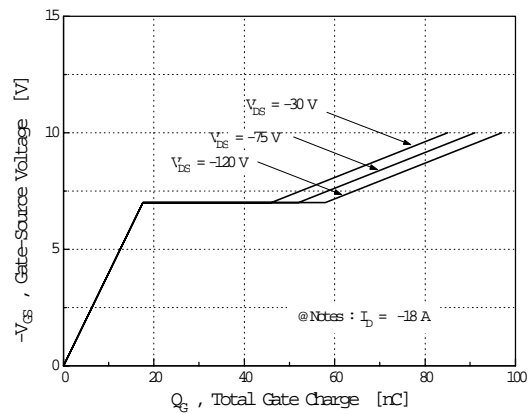
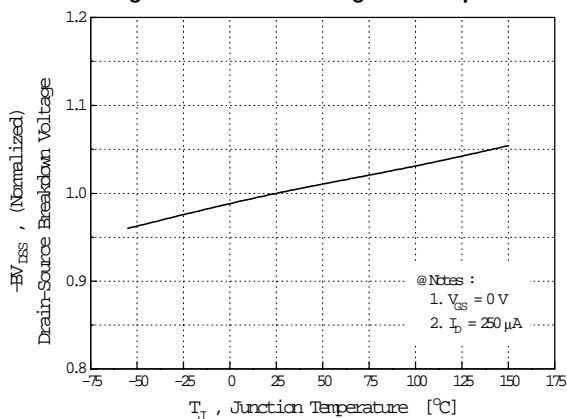


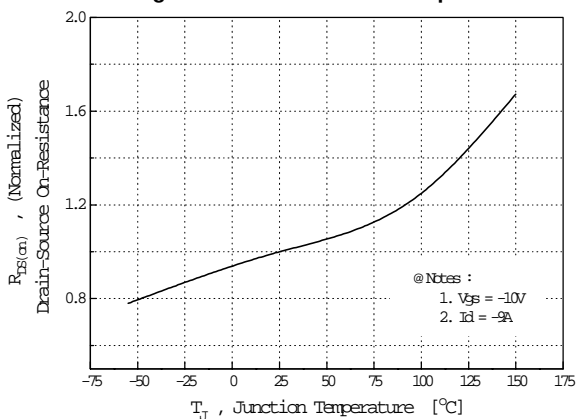
Fig 6. Gate Charge vs. Gate-Source Voltage



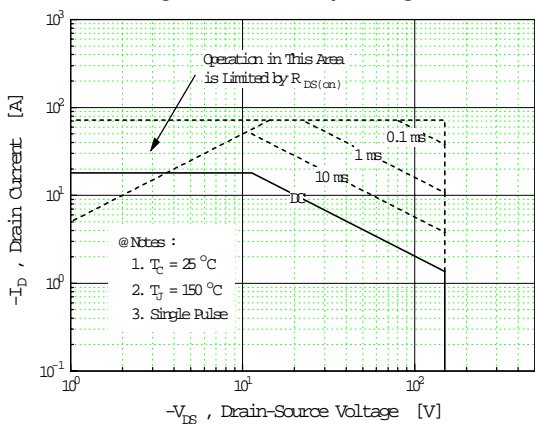
**Fig 7. Breakdown Voltage vs. Temperature**



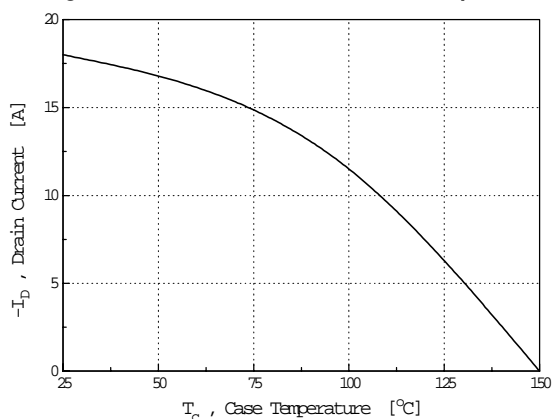
**Fig 8. On-Resistance vs. Temperature**



**Fig 9. Max. Safe Operating Area**



**Fig 10. Max. Drain Current vs. Case Temperature**



**Fig 11. Thermal Response**

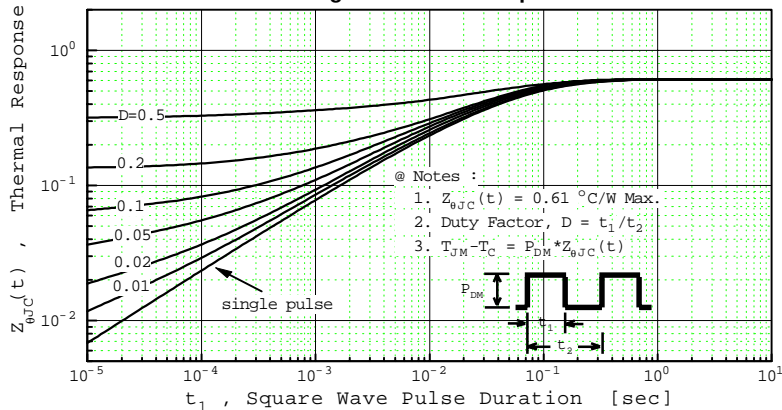


Fig 12. Gate Charge Test Circuit & Waveform

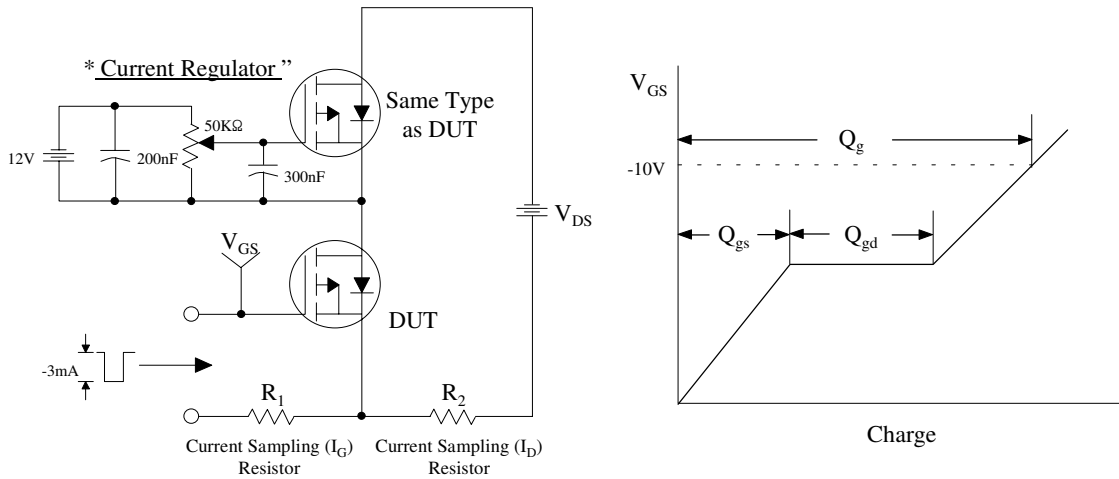


Fig 13. Resistive Switching Test Circuit & Waveforms

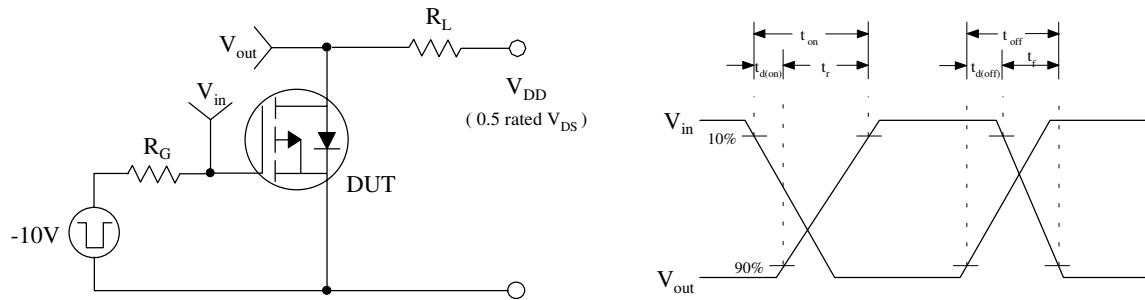


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

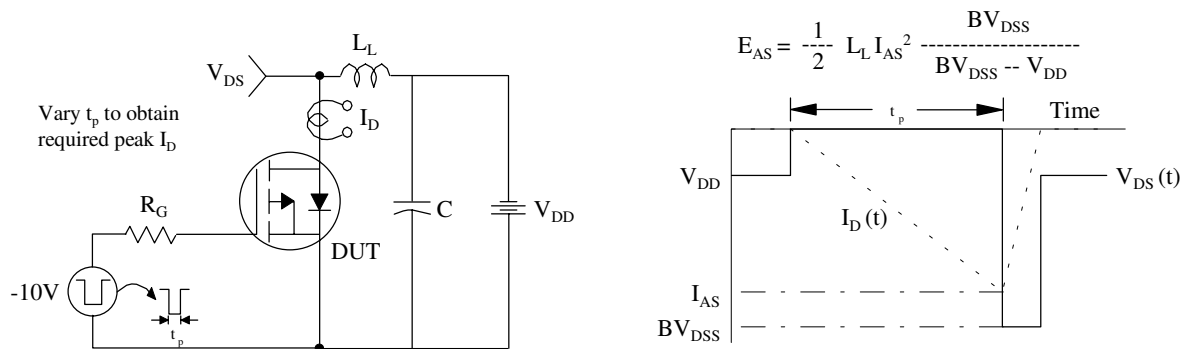


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

