

**FEATURES**

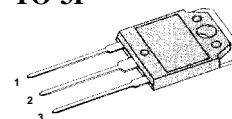
- v Avalanche Rugged Technology
- v Rugged Gate Oxide Technology
- v Lower Input Capacitance
- v Improved Gate Charge
- v Extended Safe Operating Area
- v 175°C Operating Temperature
- v Lower Leakage Current : 10 μA (Max.) @  $V_{DS} = -100V$
- v Lower  $R_{DS(ON)}$  : 0.161 Ω (Typ.)

$$BV_{DSS} = -100 V$$

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

$$I_D = -19 A$$

**TO-3P**



1.Gate 2. Drain 3. Source

**Absolute Maximum Ratings**

Symbol	Characteristic	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	-100	V
$I_D$	Continuous Drain Current ( $T_C=25^\circ C$ )	-19	A
	Continuous Drain Current ( $T_C=100^\circ C$ )	-13.3	
$I_{DM}$	Drain Current-Pulsed ①	-76	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy ②	600	mJ
$I_{AR}$	Avalanche Current ①	-19	A
$E_{AR}$	Repetitive Avalanche Energy ①	16.6	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-6.5	V/ns
$P_D$	Total Power Dissipation ( $T_C=25^\circ C$ )	166	W
	Linear Derating Factor	1.11	
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	- 55 to +175	°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	--	0.9	°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	-100	--	--	V	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA
ΔBV/ΔT <sub>J</sub>	Breakdown Voltage Temp. Coeff.	--	-0.11	--	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> =-20V
	Gate-Source Leakage , Reverse	--	--	100		V <sub>GS</sub> =20V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	--	--	-10	μA	V <sub>DS</sub> =-100V
		--	--	-100		V <sub>DS</sub> =-80V, T <sub>C</sub> =150°C
R <sub>DS(on)</sub>	Static Drain-Source On-State Resistance	--	--	0.2	Ω	V <sub>GS</sub> =-10V, I <sub>D</sub> =-9.5A ④
g <sub>fs</sub>	Forward Transconductance	--	9.7	--	Ū	V <sub>DS</sub> =-40V, I <sub>D</sub> =-9.5A ④
C <sub>iss</sub>	Input Capacitance	--	1180	1535	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =-25V, f=1MHz <b>See Fig 5</b>
C <sub>oss</sub>	Output Capacitance	--	240	360		
C <sub>rss</sub>	Reverse Transfer Capacitance	--	83	125		
t <sub>d(on)</sub>	Turn-On Delay Time	--	14	40	ns	V <sub>DD</sub> =-50V, I <sub>D</sub> =-17A, R <sub>G</sub> =12 Ω <b>See Fig 13</b> ④⑤
t <sub>r</sub>	Rise Time	--	22	55		
t <sub>d(off)</sub>	Turn-Off Delay Time	--	45	100		
t <sub>f</sub>	Fall Time	--	26	60		
Q <sub>g</sub>	Total Gate Charge	--	43	54	nC	V <sub>DS</sub> =-80V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-17A <b>See Fig 6 &amp; Fig 12</b> ④⑤
Q <sub>gs</sub>	Gate-Source Charge	--	7.4	--		
Q <sub>gd</sub>	Gate-Drain( " Miller " ) Charge	--	17.8	--		

## Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I <sub>S</sub>	Continuous Source Current	--	--	-19	A	Integral reverse pn-diode in the MOSFET
I <sub>SM</sub>	Pulsed-Source Current ①	--	--	-76		
V <sub>SD</sub>	Diode Forward Voltage ④	--	--	-4.0	V	T <sub>J</sub> =25°C, I <sub>S</sub> =-19A, V <sub>GS</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	--	135	--	ns	T <sub>J</sub> =25°C, I <sub>F</sub> =-17A
Q <sub>rr</sub>	Reverse Recovery Charge	--	0.7	--	μC	di <sub>F</sub> /dt=100A/μs ④

### Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② L=2.5mH, I<sub>AS</sub>=-19A, V<sub>DD</sub>=-25V, R<sub>G</sub>=27Ω\*, Starting T<sub>J</sub>=25°C
- ③ I<sub>SD</sub> ≤ -17A, 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

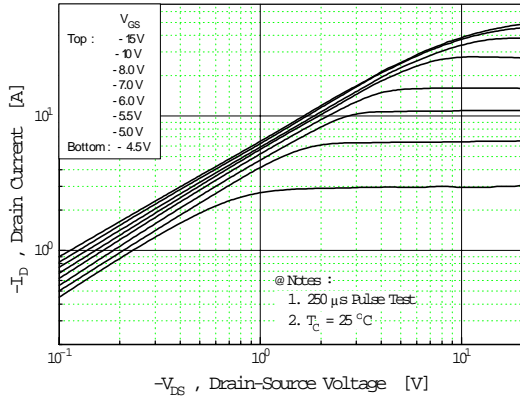


Fig 2. Transfer Characteristics

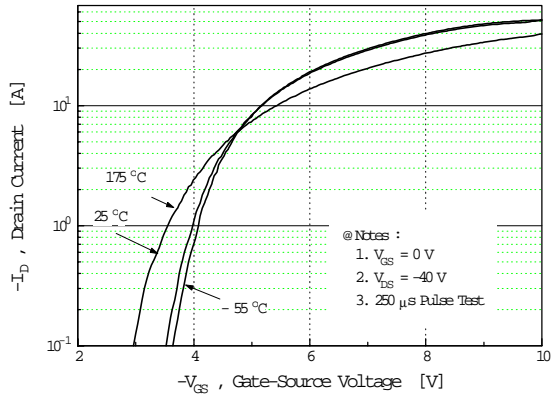


Fig 3. On-Resistance vs. Drain Current

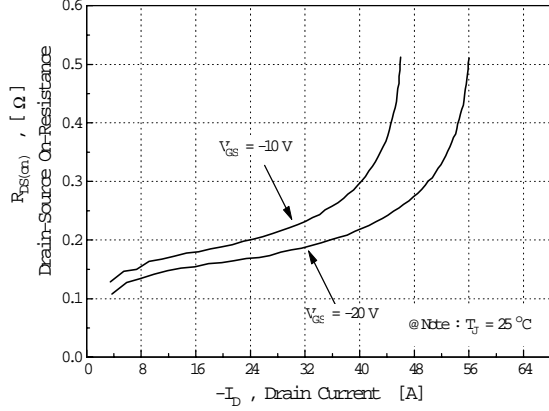


Fig 4. Source-Drain Diode Forward Voltage

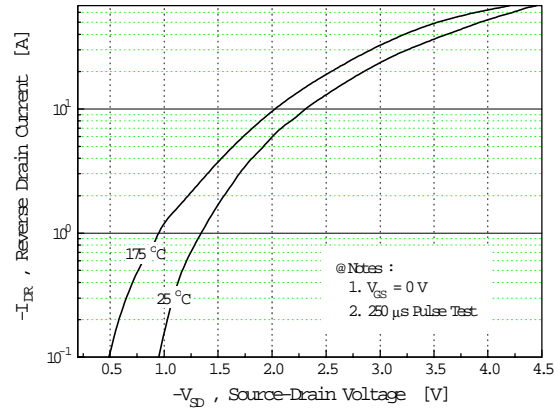


Fig 5. Capacitance vs. Drain-Source Voltage

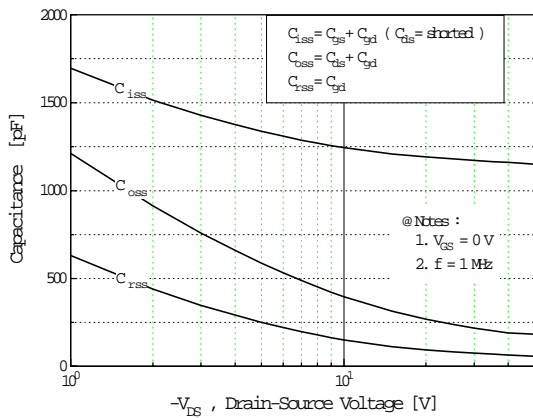
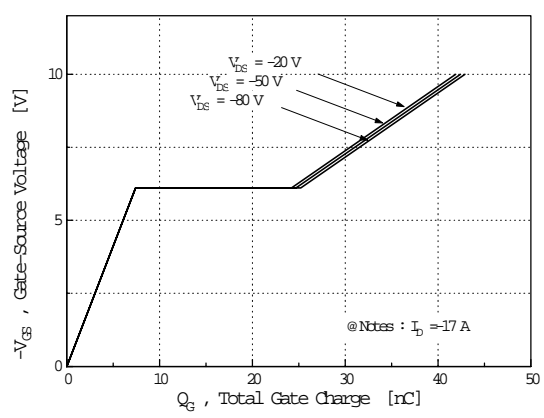


Fig 6. Gate Charge vs. Gate-Source Voltage



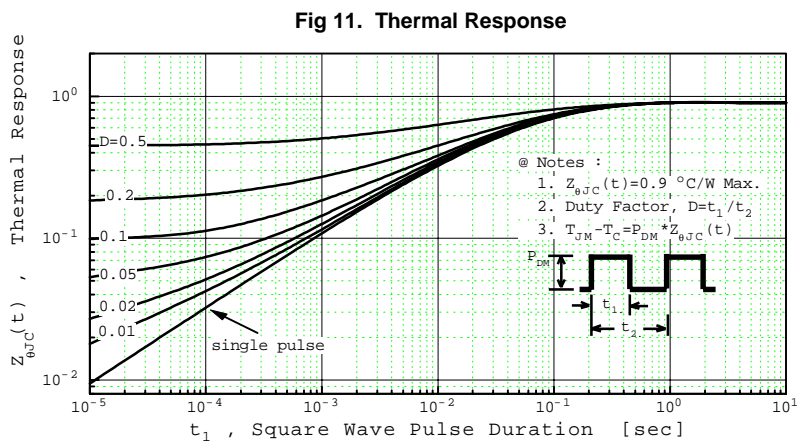
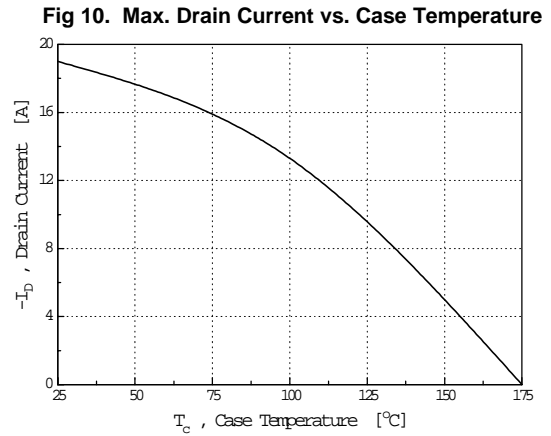
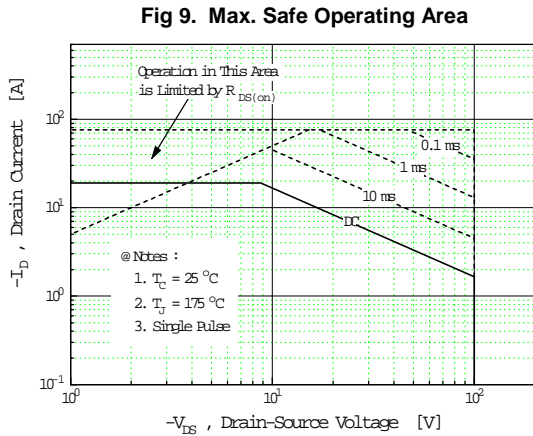
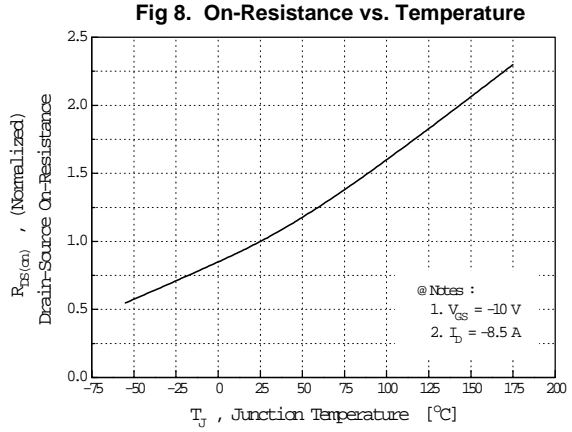
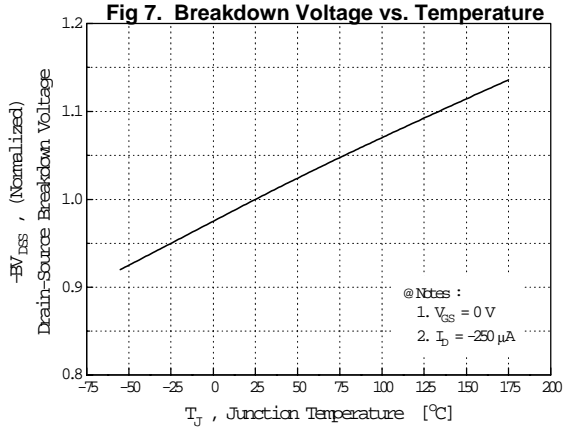


Fig 12. Gate Charge Test Circuit & Waveform

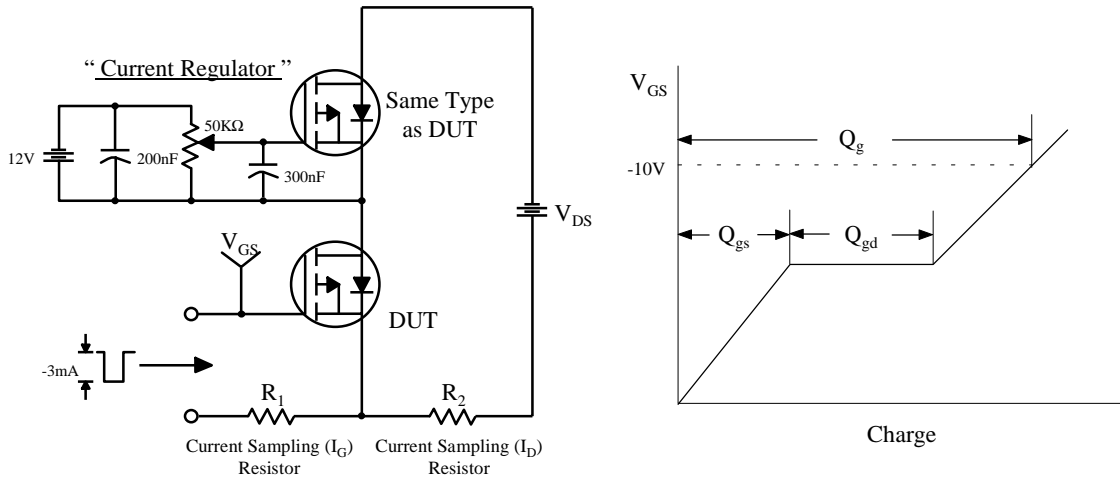


Fig 13. Resistive Switching Test Circuit & Waveforms

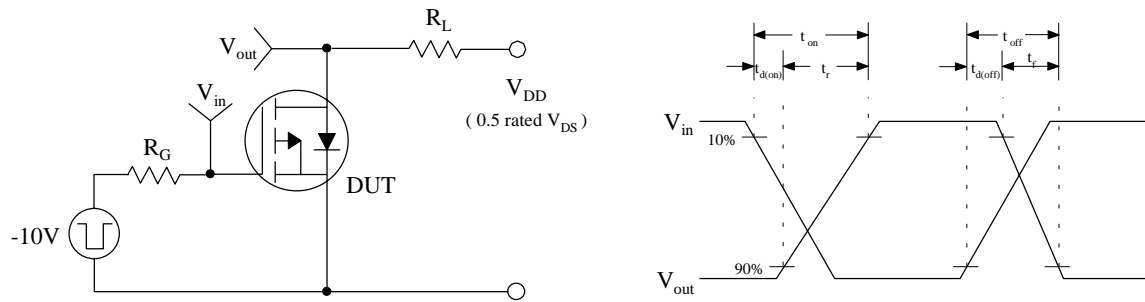


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

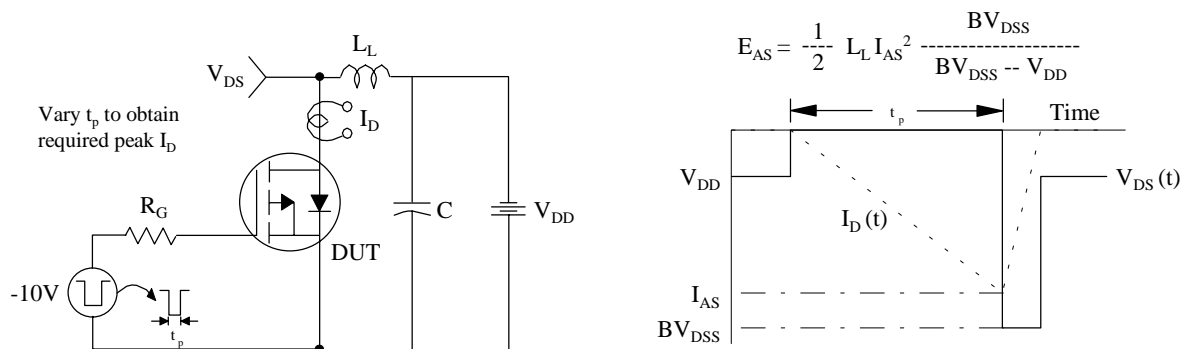
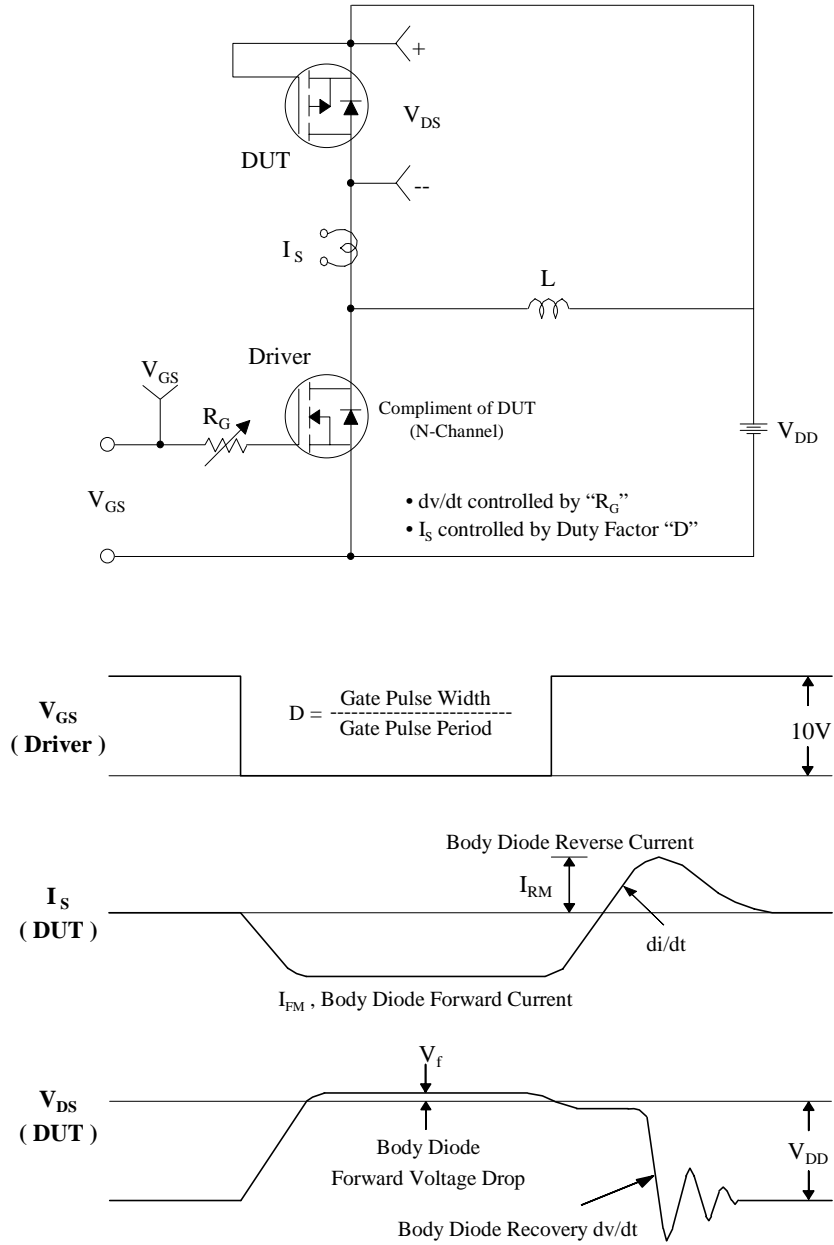


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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