

N-Channel Power MOSFET

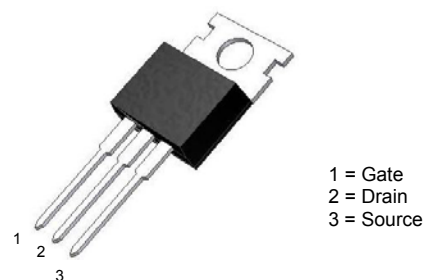
8A, 600V, 1.0Ω

GENERAL DESCRIPTION

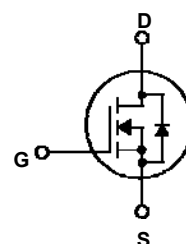
The N-Channel MOSFET is used an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance. This device is well suited for high efficiency switched mode power suppliers, active power factor correction, electronic lamp ballasts based half bridge topology.

FEATURES

- Robust high voltage termination
- Avalanche energy specified
- Diode is characterized for use in bridge circuits
- Source to Drain diode recovery time comparable to a discrete fast recovery diode.



TO-220AB



DEVICE MARKING DESIGNATION:

Line 1 = TC Brand
Line 2 = Device Type

ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise noted)

Symbol	Parameter	Value	Units
V _{DSS}	Drain- Source Voltage	600	V
V _{GSS}	Gate-Source Voltage	±30	V
I _D	Drain Current	8.0	A
I _{DM}	Drain Current Pulsed	32	A
P _D	Power Dissipation (Note 2)	147	W
	Derating Factor above 25°C	1.18	W/°C
E _{AS}	Single Pulsed Avalanche Energy (Note 1)	614	mJ
E _{AR}	Repetitive Avalanche Energy (Note 2)	14.7	mJ
T _J	Operating Junction Temperature	150	°C
T _{stg}	Storage Temperature Range	- 55 to +150	°C

Notes:

1. L=20mH, I_{AS}=8.0A, V_{DD}=50V, R_G=50 Ω, Starting T_J=25°C
2. Repetitive Rating: Pulse width limited by maximum junction temperature.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case	0.85	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

ELECTRICAL CHARACTERISTICS

Off Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	600	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 600V, V_{GS} = 0V$	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30V, V_{DS} = 0V$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30V, V_{DS} = 0V$	--	--	-100	nA

On Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
$R_{DS(ON)}$	On-Resistance	$V_{GS} = 10V, I_D = 4A$	--	0.86	1.0	Ω

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	--	1075	1340	pF
C_{oss}	Output Capacitance		--	116	145	pF
C_{rss}	Reverse Transfer Capacitance		--	34	43	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 300V, I_D = 8.0A,$ $R_G = 50\Omega$ (Note 3 & 4)	--	25	60	nS
t_r	Turn-On Rise Time		--	100	210	nS
$t_{d(off)}$	Turn-Off Delay Time		--	97	204	nS
t_f	Turn-Off Fall Time		--	54	118	nS
Q_g	Total Gate Charge	$V_{DS} = 480V, I_D = 8.0A,$ $V_{GS} = 10V$ (Note 3 & 4)	--	38	46	nC
Q_{gs}	Gate-Source Charge		--	6	--	nC
Q_{gd}	Gate-Drain Charge		--	20	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	8.0	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	32	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 8.0A$	--	--	1.5	V
T_{rr}	Reverse Recovery Time	$V_{GS} = 0V, I_S = 8.0A,$ $dI_F / dt = 100A/\mu S$ (Note 3)	--	390	--	nS
Q_{rr}	Reverse Recovery Charge		--	2.5	--	μC

Notes:

- Pulse Test: Pulse width $< 300\mu s$, Duty cycle $\leq 2\%$.
- Basically not affected by working temperature.

TYPICAL CHARACTERISTICS

Fig 1. On-State Characteristics

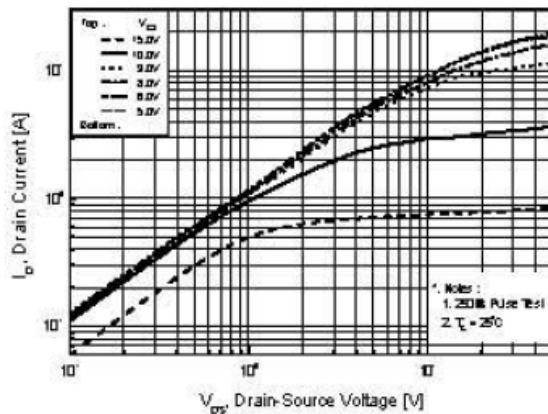


Fig 2. Transfer Characteristics

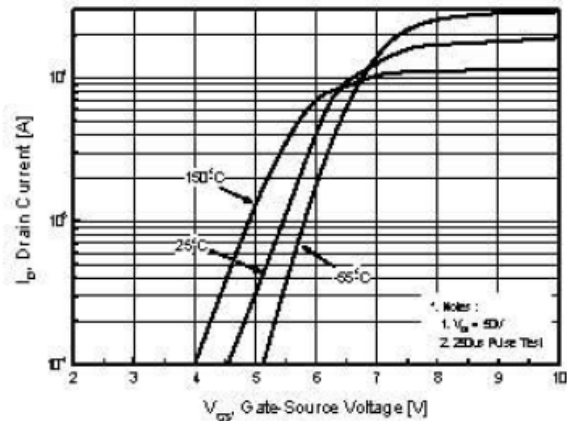


Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage

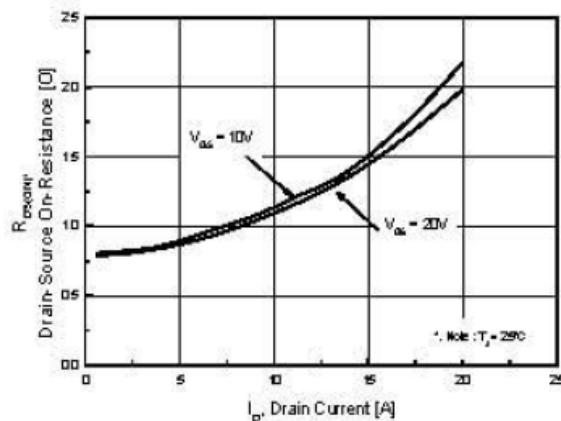


Fig 4. On State Current vs.

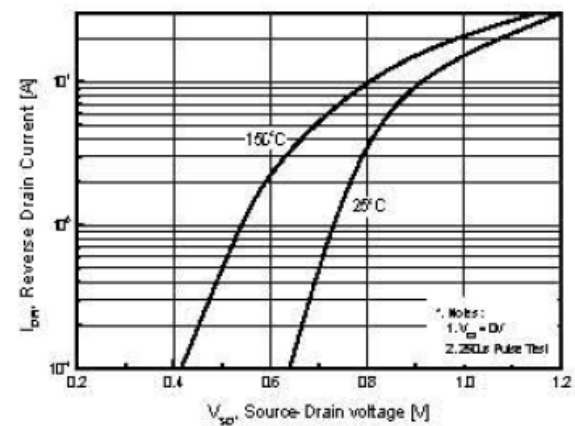


Fig 5. Capacitance Characteristics (Non-Repetitive)

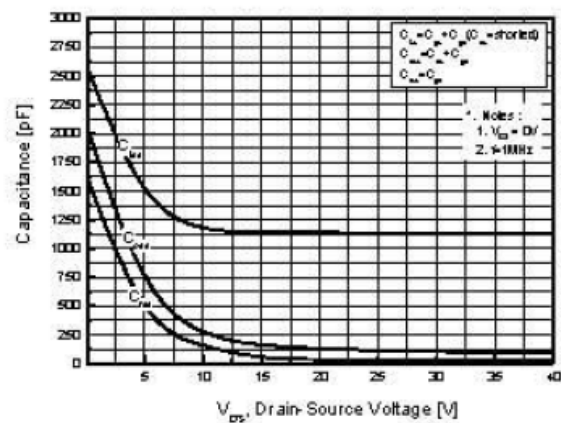


Fig 6. Gate Charge Characteristics

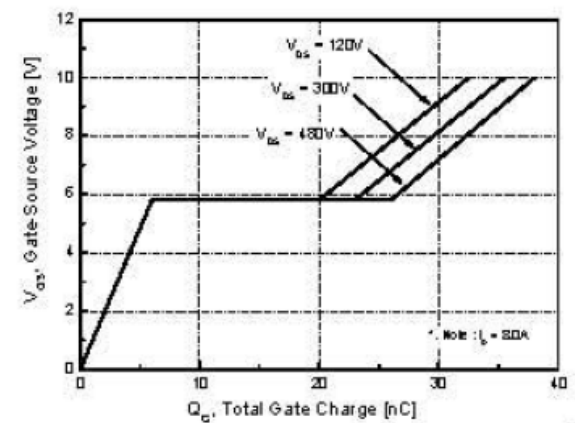


Fig 7. Breakdown Voltage Variation vs. Junction Temperature

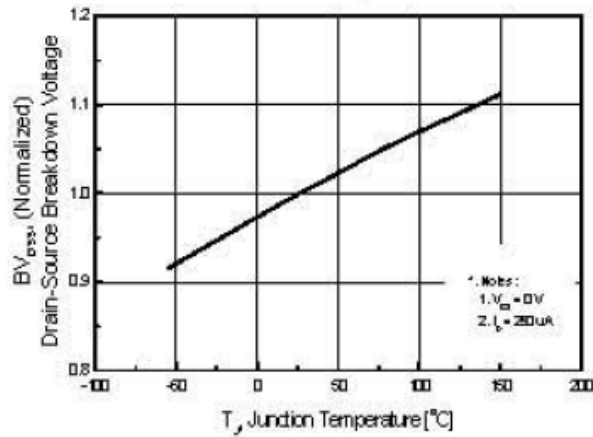


Fig 8. On-Resistance Variation vs. Junction Temperature

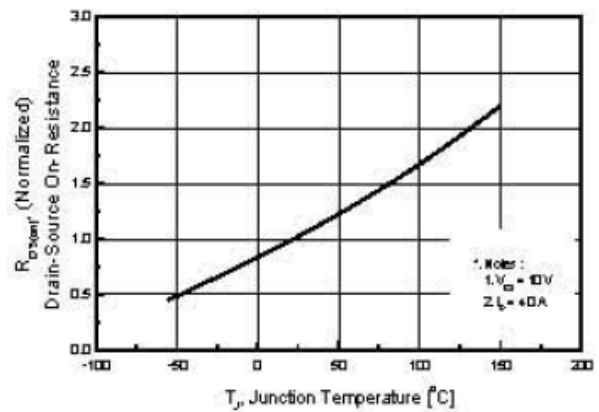


Fig 9. Maximum Safe Operating Area

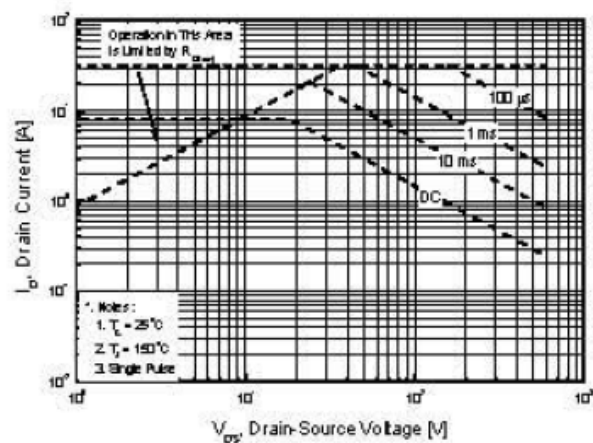


Fig 10. Maximum Drain Current

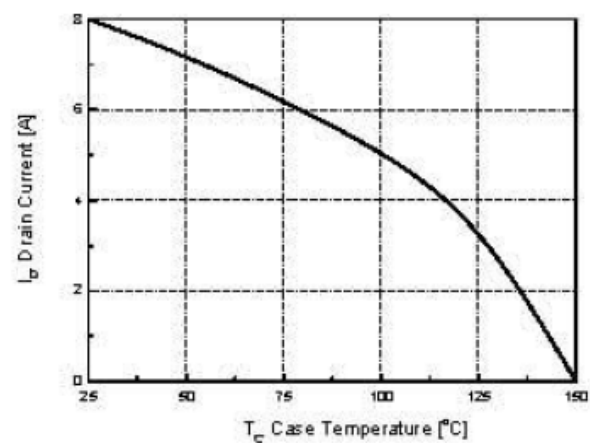


Fig 11. Transient Thermal Response Curve

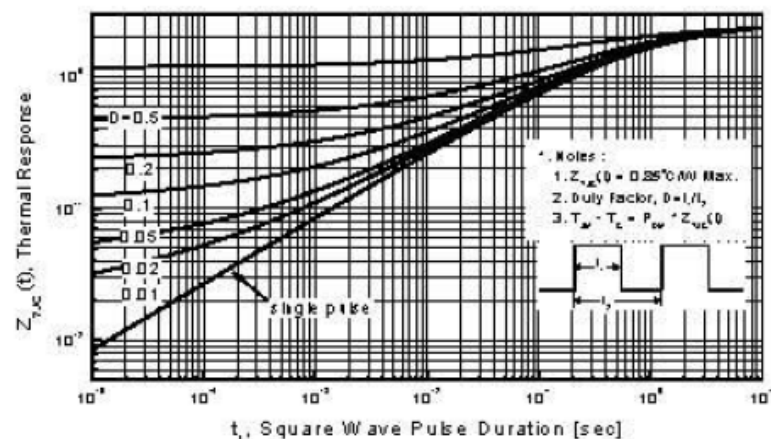


Fig. 12. Gate Charge Test Circuit & Waveforms

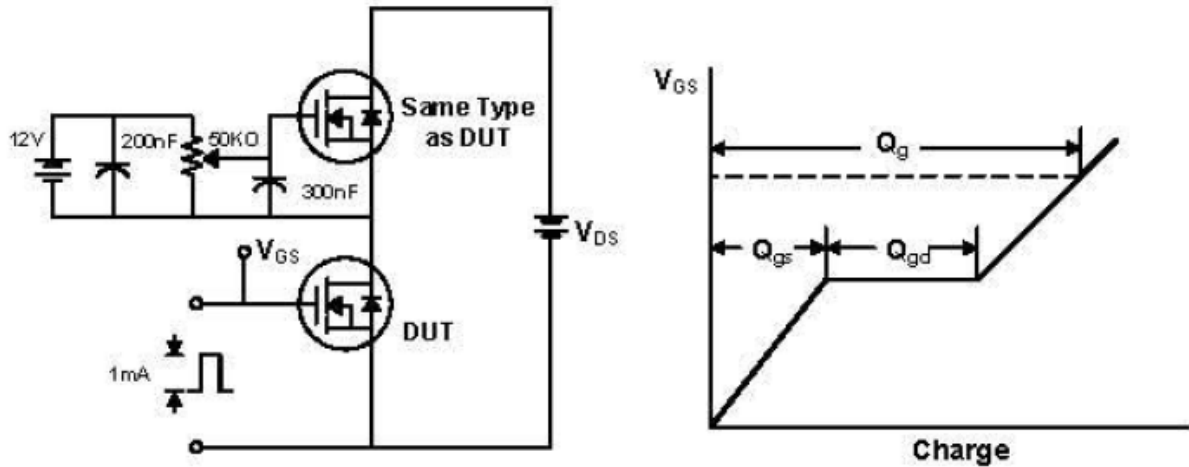


Fig 13. Switching Time Test Circuit & Waveforms

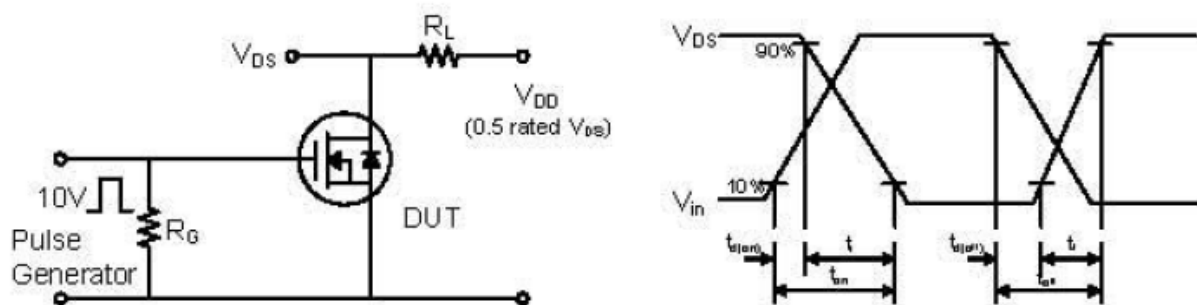
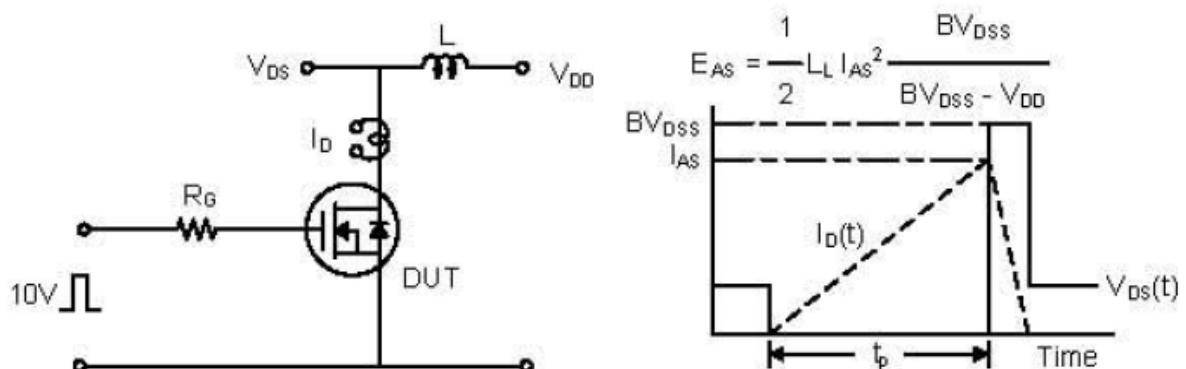
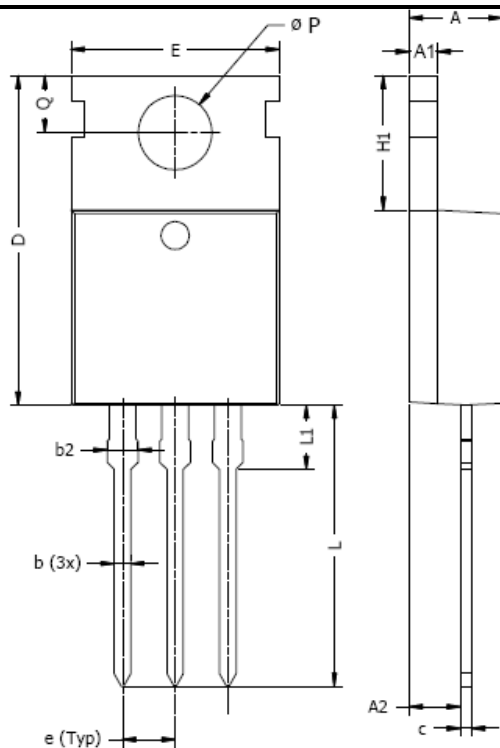


Fig 14. Unclamped Inductive switching Test Circuit & Waveforms



TO220AB PACKAGE OUTLINE



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	3.6	4.8	0.142	0.189
A1	1.2	1.4	0.047	0.055
A2	2.0	2.9	0.079	0.114
b	0.4	1.0	0.016	0.039
b2	1.2	1.8	0.047	0.071
c	0.36	0.6	0.014	0.024
D	14.2	16.5	0.559	0.650
e	2.34	2.74	0.092	0.108
E	9.7	10.6	0.382	0.417
H1	5.8	6.85	0.228	0.270
L	12.7	14.7	0.500	0.579
L1	2.7	3.3	0.106	0.130
$\varnothing P$	3.5	4.0	0.138	0.157
Q	2.54	3.4	0.100	0.134

NOTE: Above package outline conforms to JEDEC TO-220AB

NOTICE

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