

N-Channel Enhancement Mode Field Effect Transistor

Features

- 60V/55A
 $R_{DS(ON)} = 22m\Omega$ (Type) @ $V_{GS}=10V$
 $R_{DS(ON)} = 28m\Omega$ (Type) @ $V_{GS}=4.5V$
- Super High Dense Cell Design
- Reliable and Rugged
- TO-220 package

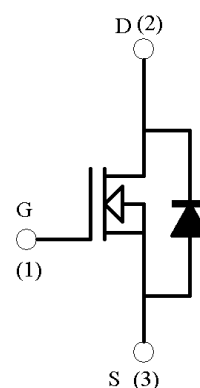
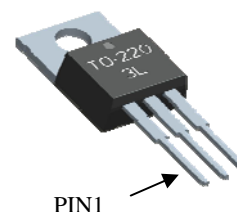


Lead Free and Green Devices Available
(ROHS Compliant)

Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered System.

Pin Description



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

Symbol	Parameter	Value	Unit	
V_{DSS}	Drain-to-Source Voltage	60	V	
V_{GSS}	Gate-to-Source Voltage	± 20	V	
I_D^*	Continuous Drain Current @ $T_J = 125^\circ C$	55	A	
I_{DM}^*	Pulsed Drain Current ($t_p \leq 10\mu s$)	160		
I_S^*	Diode Continuous Forward Current	5	A	
P_D^*	Total Power Dissipation	$T_A = 25^\circ C$	100	W
		$T_A = 100^\circ C$	50	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ C$	
$R_{th JA}^*$	Thermal Resistance, Junction-to-Ambient	65	$^\circ C/W$	
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	260	$^\circ C$	

Note: *Surface Mounted on 1in² 1in pad area, $t \leq 10$ Sec.

Electrical characteristics TCASE = 25 °C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
● states						
Drain-Source Breakdown Voltage	BVDSS	V _{GS} =0V, I _{DS} =250μA	60			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =48V, V _{GS} =0V			1	μA
Gate-body leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.6	2.5	V
Drain-Source On-state Resistance	R _{DS(ON)(a)}	V _{GS} =10V, I _D =20.A		22	26	mΩ
		V _{GS} =4.5V, I _D =10A		28	33	
Diode Forward Voltage	VSD	V _{GS} =0V, I _S =1.25A		0.874	1.3	V
Forward Tran conductance	gFS	V _{GS} =7V, I _D =1A		6		S
● Gate charge						
Total gate charge	Q _g	V _{DS} =15V, I _D =1A , V _{GS} =10V		85		nC
Gate-source charge	Q _{gs}			20		
Gate-Drain Charge	Q _{gd}			28		
● Dynamic (b)						
Input capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V f=1.0MHZ		4101		pF
Output capacitance	C _{OSS}			534		
Reverse transfer capacitance	C _{rSS}			214		
● Switching times						
Turn-On Delay Time	t _{D(ON)}	V _{DD} =15V, I _D =1A, V _{GEN} =10V R _L =10ohm , R _{GEN} =10ohm		24		ns
Rise Time	t _r			14		
Turn-Off Delay Time	t _{D(OFF)}			79		
Fall Time	t _f			43		

Notes

- (a). Surface Mounted on FR4 Board, t ≤ 10sec
- (b). Pulse Test: Pulse Width ≤ 300Us, Duty ≤ 2%
- (c). Guaranteed by design, not subject to production testing.

Figure 1. Output Characteristics

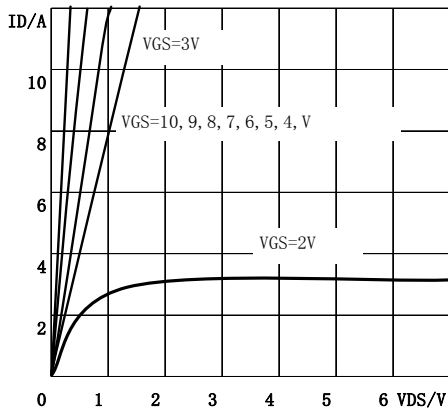


Figure 2. Transfer Characteristics

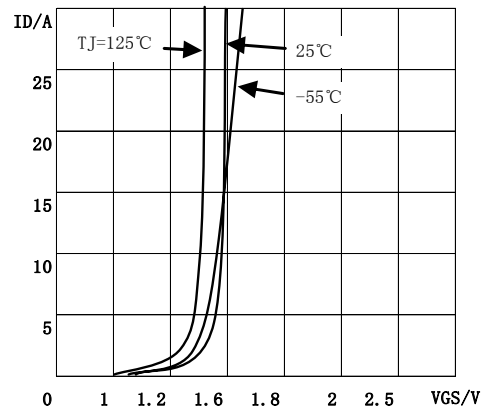


Figure 3. Capacitance variations

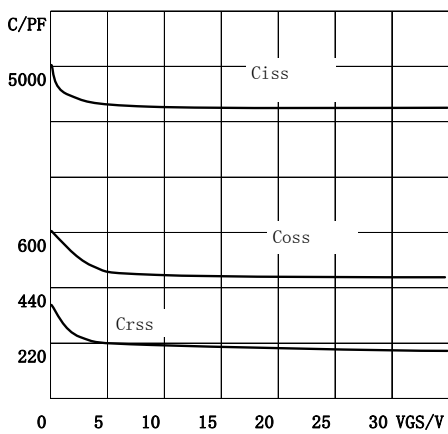


Figure 4. On-Resistance Variation with Temperature

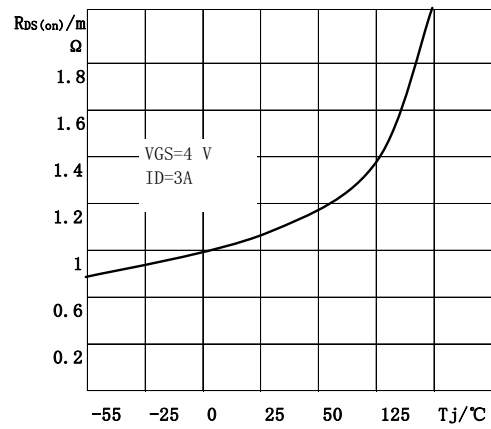


Figure 5. Gate Threshold Variation with Temperatures

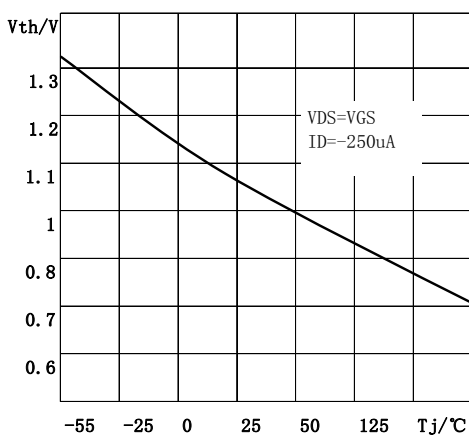


Figure 6. Breakdown Voltage Variation with temperatures

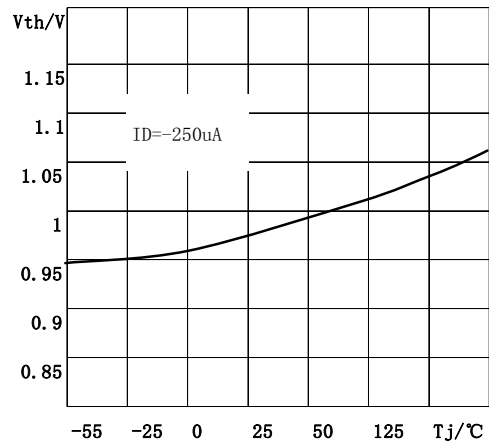


Figure7. Transconductance Variation With Drain Current

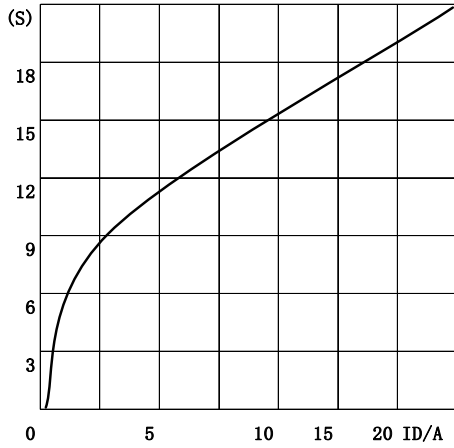


Figure8. Body Diode Forward Voltage Variation with Source Current

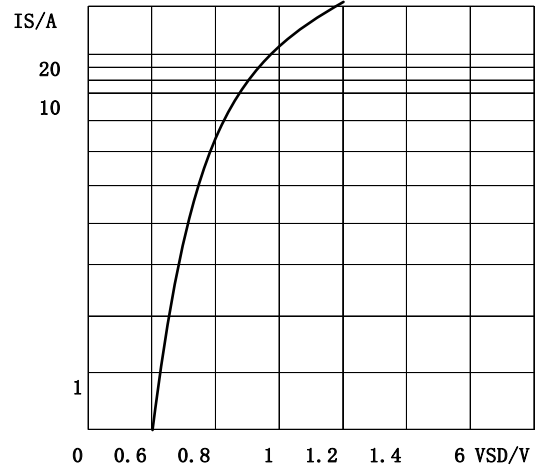


Figure9. Gate charge VS. Gate-source Voltage

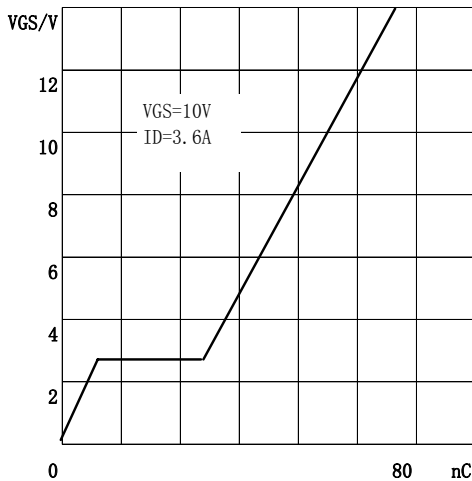


Figure10. Maximum Safe Operating Area

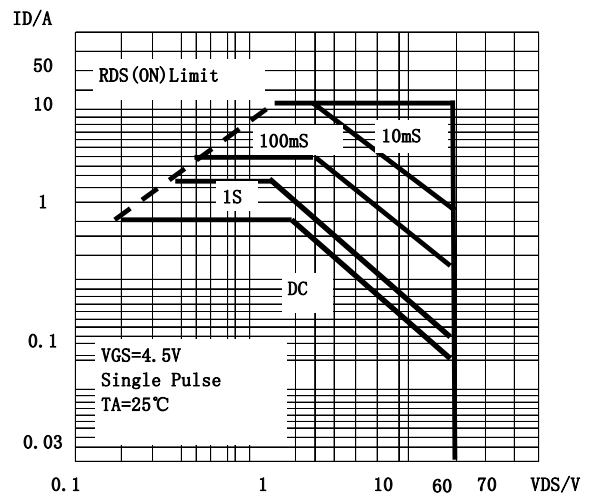


Figure 1. Switching times test circuit for Resistive load

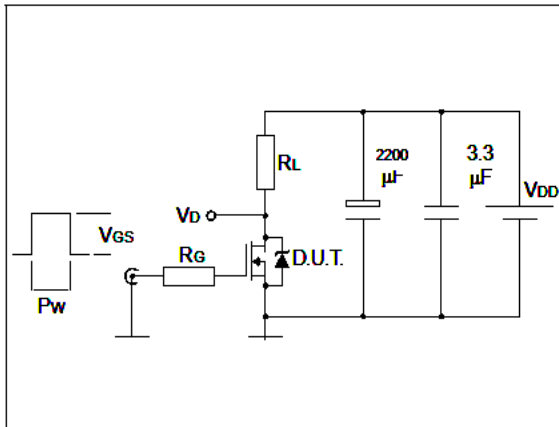


Figure 2. Gate charge test circuit

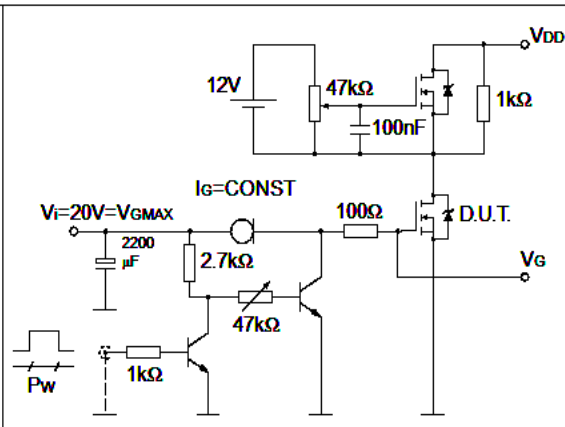


Figure 3. Test circuit for inductive load and diode recovery times

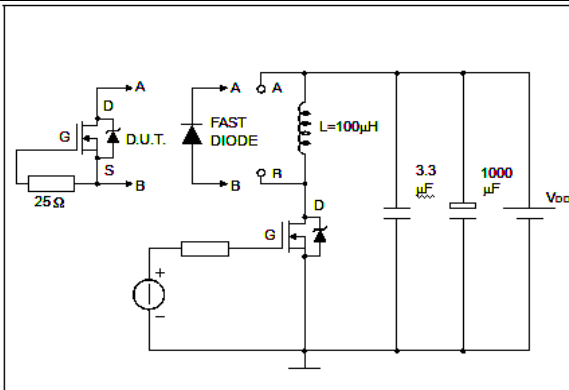


Figure 4. Unclamped Inductive load test circuit switching

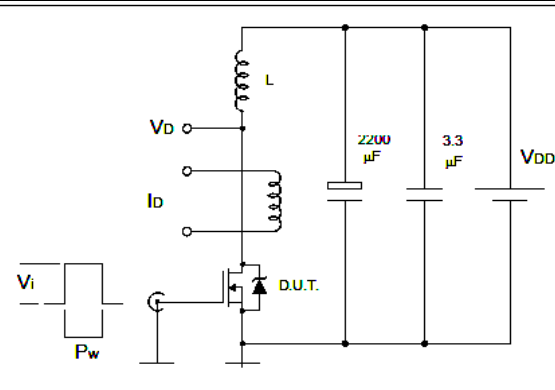


Figure 5. Unclamped inductive waveform

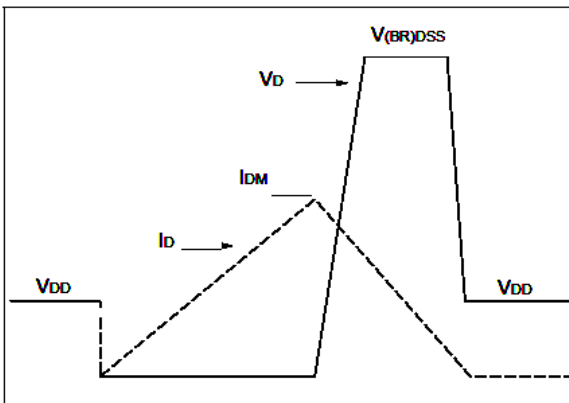
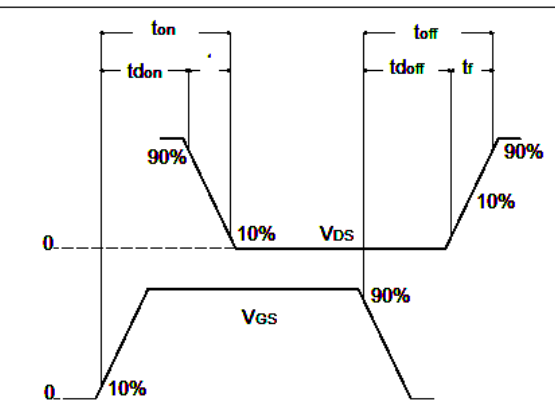
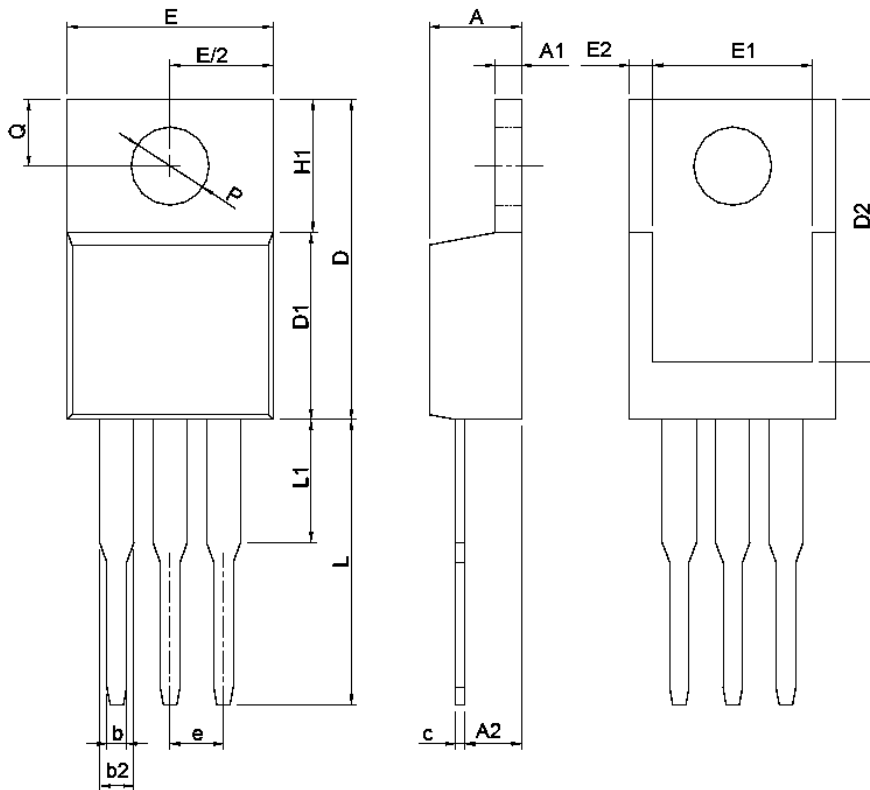


Figure 6. Switching time waveform





Package Information
TO-220



Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.02	0.330	0.355
D2	12.19	12.88	0.480	0.507
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
E2	-	0.76	-	0.030
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1	-	6.35	-	0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135



Carrier Tape & Reel Dimensions

Devices per Unit

Package Type	UnitQuantity	Quantity
TO-220		50