N-Channel Enhancement Mode Power MOSFET

Description

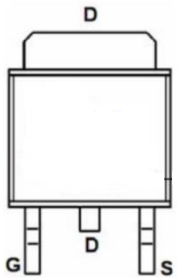
This Power MOSFET is produced using advanced TRENCH technology.
This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

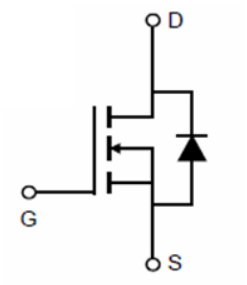
Features

- V_{DS}=20V , I_D=60A
- $R_{DS(ON)TYP}$ =5mΩ @V_{GS} =4.5V
- $R_{DS(ON)TYP}$ = 7.1mΩ @V_{GS} =2.5V
- Very Low On-resistance RDS(ON)
- Low Crss
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



TO-252-2L top view





Schematic diagram

Applications

- PWM Application
- Load Switch
- Power Management

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-source Voltage		V_{DS}	20	V
Gate-source Voltage		V_{GS}	±12	V
Continuous Drain Current	T_C=25℃	I_D	60	A
	T_C=100℃		39	
Pulsed Drain Current(T_C=25℃,T_p Limited By T_{jmax}) (note1)		I_{DM}	240	A
Maximum Power Dissipation(T_C=25℃)		P_D	40	W
Avalanche energy , single Pulse(L=0.5mH) (note2)		E_{AS}	90	mJ
Operating Junction And Storage Temperature		T_j,T_{stg}	-55 To 150	℃
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300	℃

Thermal Resistance

Parameter	Symbol	Max	Unit
Junction-to-Case	$R_{\theta JC}$	3.125	℃/W

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T_J =25℃, V_{DD} =10V, V_G =10V, R_G =25Ω, L=0.5mH
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%

Electrical Characteristic (TC=25℃unless otherwise noted)

Parameter	Symbol	Value			Unit	Test Condition
		Min.	Typ.	Max.		
Off Characteristic						
Drain-source breakdown voltage	BV_{DSS}	20	-	-	V	V_{GS}=0V, I_D=250μA
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	V_{DS}=20V, V_{GS}=0V
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±12V, V_{DS}=0V
On Characteristics						
Gate threshold voltage	$V_{GS(th)}$	0.4	0.7	1.0	V	V_{DS}=V_{GS}, I_D=250μA
Drain-source on-state resistance	$R_{DS(on)}$	-	5	6.8	mΩ	V_{GS}=4.5V, I_D=30A
		-	7.1	9.8	mΩ	V_{GS}=2.5V, I_D=30A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	1625	-	PF	V_{GS}=0V, V_{DS}=10V, f=1.0MHz
Output Capacitance	C_{oss}	-	280	-		
Reverse Transfer Capacitance	C_{rss}	-	269	-		
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	-	17	-	nS	V_{GS}=4.5V ,V_{DS}=10V, I_D=30A，R_G=3Ω
Turn-on Rise time	t_r	-	50	-		
Turn-off delay time	$t_{d(off)}$	-	75			
Turn-off Fall time	t_f	-	25	-		
Gate Total Charge	Q_G	-	43.7	-	nC	V_{GS}=10V, V_{DS}=10V, I_D=60A
Gate-Source Charge	Q_{gS}	-	2.7	-		
Gate-Drain Charge	Q_{gd}	-	10.9	-		
Drain-Source Diode Characteristics						
Body Diode Forward Voltage	V_{SD}	-	0.9	1.2	V	V_{GS}=0V, I_{SD}=10A
Body Diode Forward Current	Is	-	-	60	A	-

N- Channel Typical Characteristics

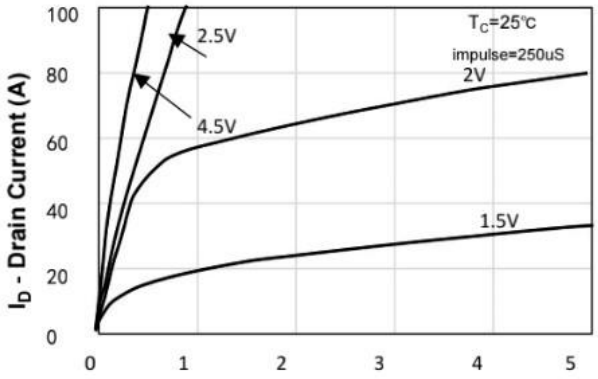


Figure 1. On-Region Characteristics

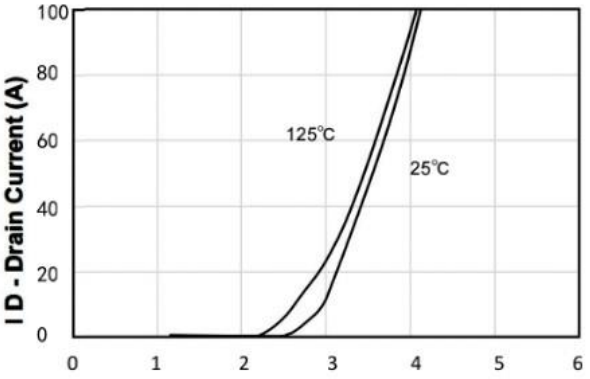


Figure 2. Transfer Characteristics

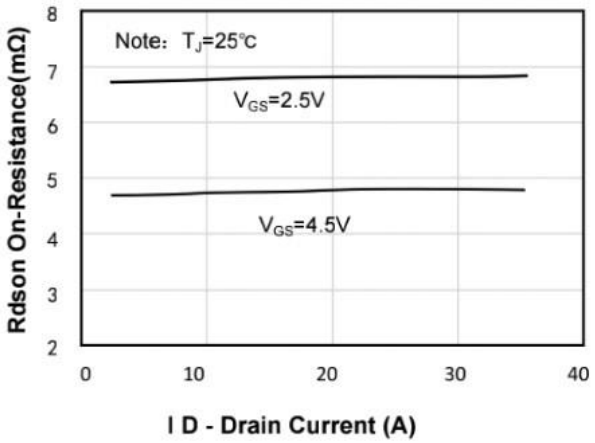


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

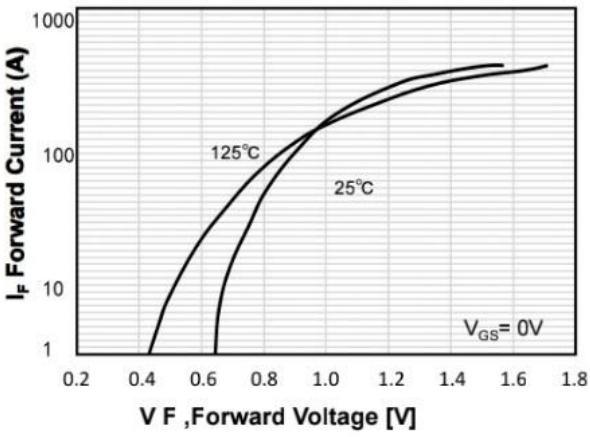


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

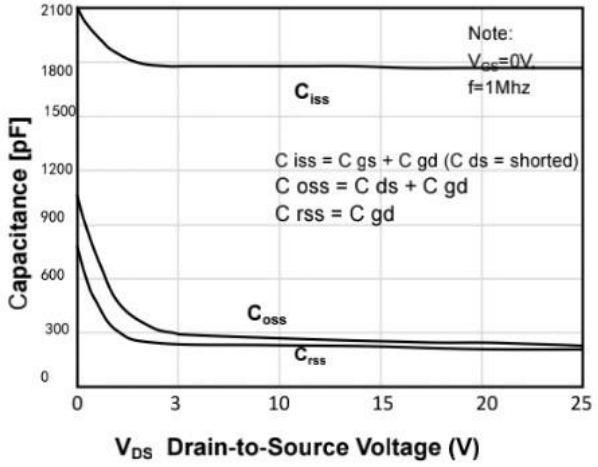


Figure 5. Capacitance Characteristics

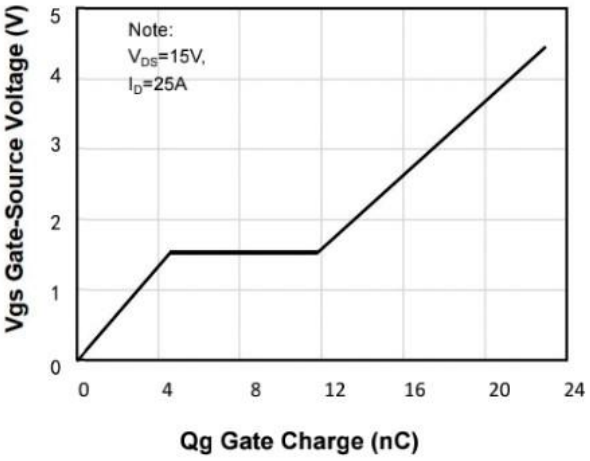


Figure 6. Gate Charge Characteristics

N- Channel Typical Characteristics (Continued)

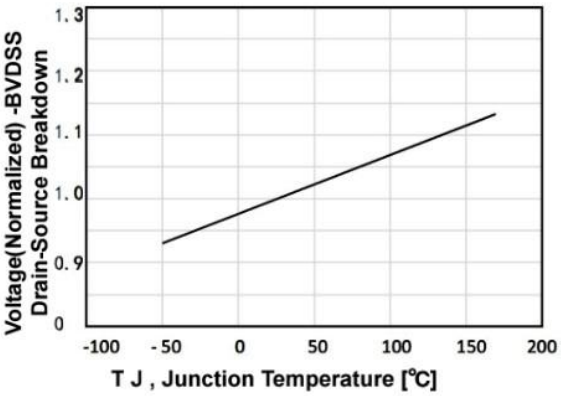


Figure 7. Breakdown Voltage Variation vs Temperature

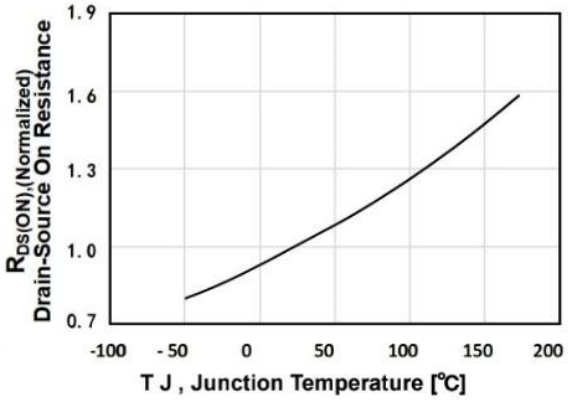


Figure 8. On-Resistance Variation vs Temperature

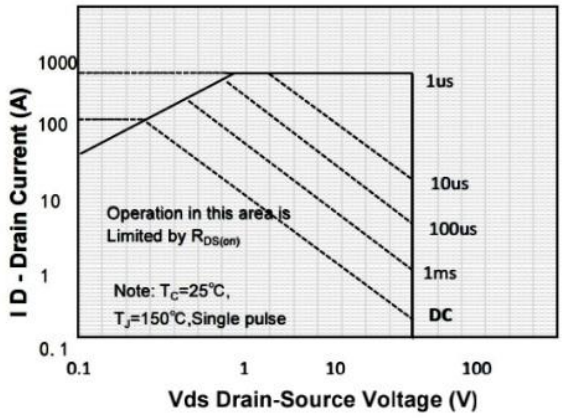


Figure 9. Maximum Safe Operating Area

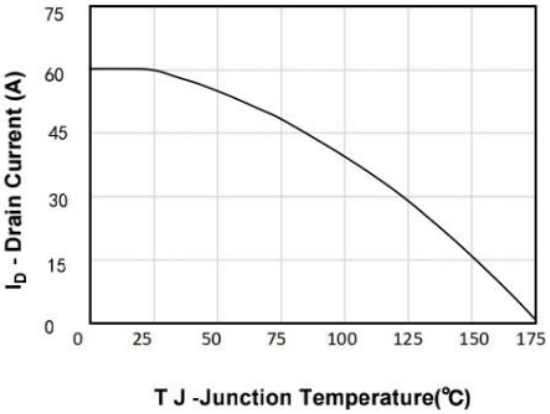


Figure 10. Maximum PContinuous Drain Currentvs Case Temperature

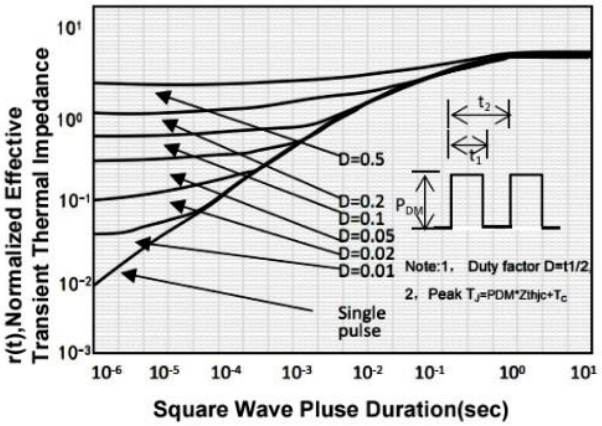
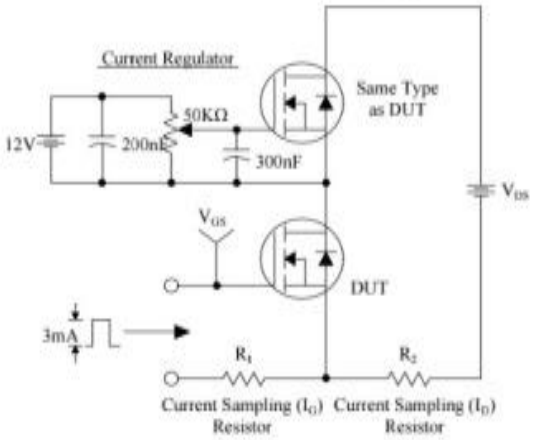
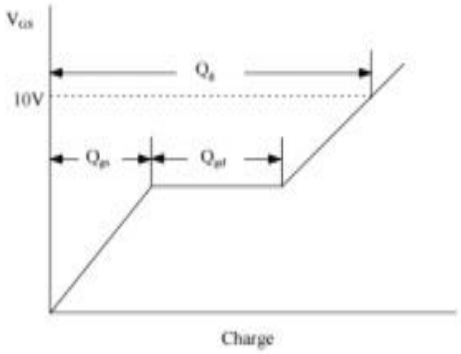


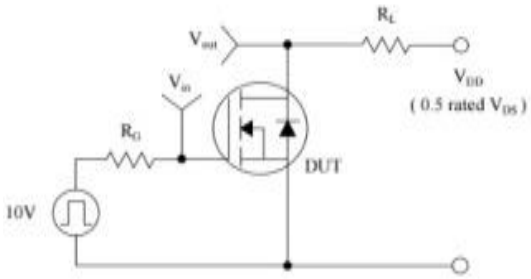
Figure 11. Transient Thermal Response Curve

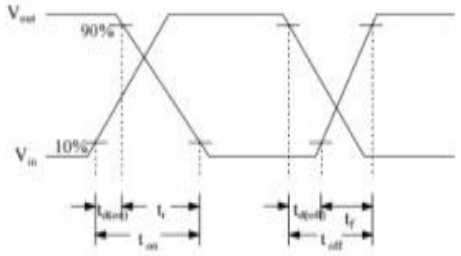
Gate Charge Test Circuit & Waveform



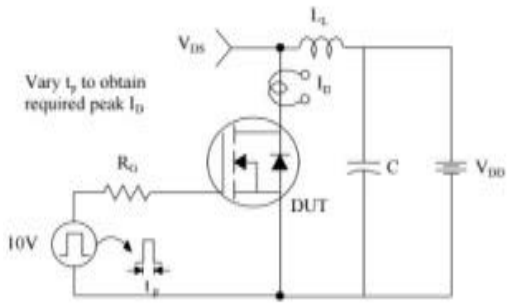


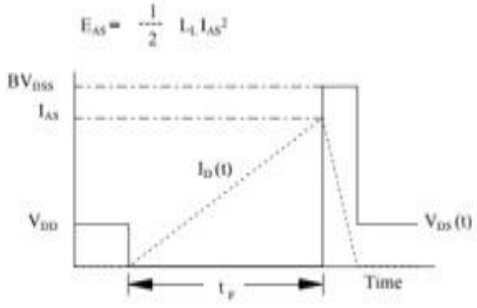
Resistive Switching Test Circuit & Waveforms



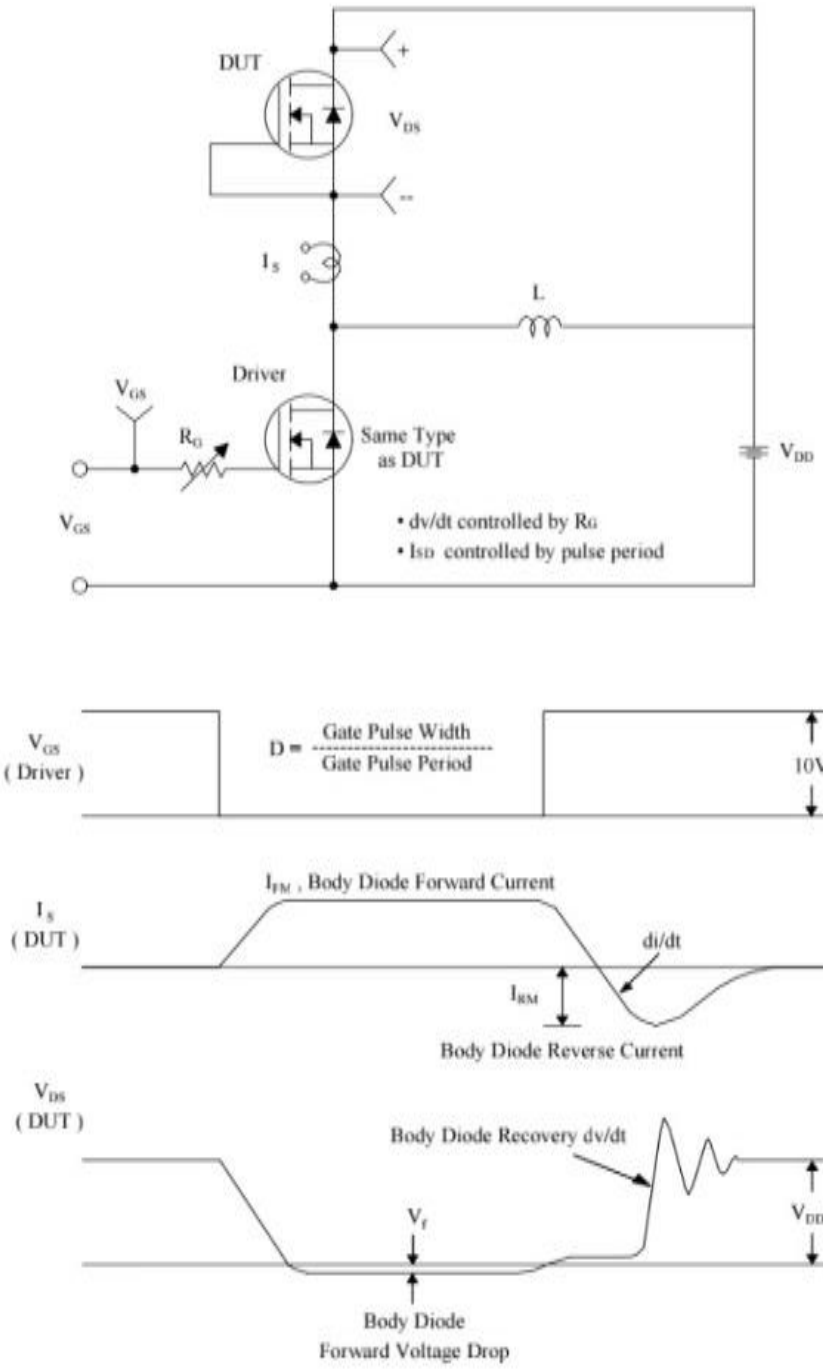


Unclamped Inductive Switching Test Circuit & Waveforms



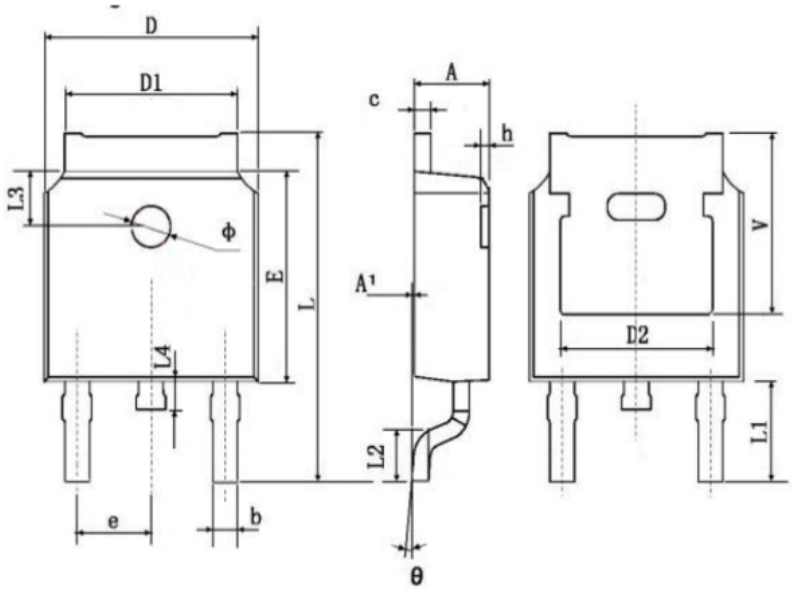


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Information

TO-252 DPAK



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.350	0.089	0.093
A1	0.050	0.150	0.002	0.006
b	0.660	0.860	0.026	0.034
c	0.458	0.558	0.018	0.022
D	6.550	6.650	0.259	0.263
D1	5.234	5.434	0.207	0.215
D2	4.826 TYP.		0.191 TYP.	
E	6.050	6.150	0.239	0.243
e	2.236	2.336	0.088	0.092
L	9.820	10.220	0.388	0.404
L1	3.000 TYP.		0.119 TYP.	
L2	1.400	1.600	0.055	0.063
L3	1.800 TYP.		0.071 TYP.	
L4	0.700	0.900	0.028	0.036
Φ	1.150	1.250	0.045	0.049
θ	0°	3°	0°	3°
h	0.000	0.300	0.000	0.012
V	5.399 TYP		0.213 TYP	

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