

30V N-Channel Power Mosfet

General Description

These N-channel enhancement mode power mosfets used advanced trench technology design, provided excellent $R_{DS(on)}$ and low gate charge. Which accords with the RoHS standard.



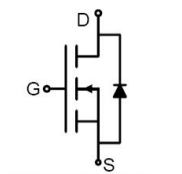
TO-252(DPAK) top view

Features

- $V_{DS} = 30V, I_D = 150A$
 $R_{DS(ON)}, 2.8 m\Omega (Typ) @ V_{GS} = 10V$
 $R_{DS(ON)}, 4.4m\Omega (Typ) @ V_{GS} = 4.5V$
- Advanced Trench Technology
- Provide Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

Application

- Load Switch
- PWM Application
- Power management



Schematic Diagram

Absolute Maximum Ratings($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Value	Unit	
Drain-Source Voltage	V_{DS}	30	V	
Gate-Source Voltage	V_{GS}	± 20	V	
Drain Current-Continuous ^{Note3}	I_D	TC=25 $^\circ C$	150	A
		TC=100 $^\circ C$	80	A
Drain Current-Pulsed ^{Note1}	I_{DM}	400	A	
Avalanche Energy ^{Note4}	E_{AS}	121	mJ	
Maximum Power Dissipation	P_D	70	W	
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ C$	
Operating Junction Temperature Range	T_J	-55 to +150	$^\circ C$	

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	-	-	2.14	$^\circ C/W$

Electrical Characteristics(T_J=25°C unless otherwise noted)

OFF CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _{DS} =250uA	30	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V	-	-	1.0	uA
Gate-Body Leakage	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA

ON CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =250uA	1.0	1.5	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _{DS} =30A	-	2.8	4.0	mΩ
		V _{GS} =4.5V, I _{DS} =20A	-	4.4	6.0	

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C _{ISS}	V _{DS} = 15V, V _{GS} = 0V, f=1MHz	-	2820	-	pF
Output Capacitance	C _{OSS}		-	393	-	
Reverse Transfer Capacitance	C _{rss}		-	330	-	
Gate Resisitance	R _g	V _{DD} =0V, V _{GS} =1V, F=1MHz	-	3.8	-	Ω

SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	T _{d(on)}	V _{GS} =10V, V _{DS} =15V, R _{GEN} =3Ω I _D =30A	-	23	-	ns
Rise Time	t _r		-	28	-	
Turn-Off Delay Time	T _{d(off)}		-	74	-	
Fall Time	t _f		-	36	-	
Total Gate Charge at 10V	Q _g	V _{DS} =15V, I _{DS} =30A, V _{GS} =10V	-	30	-	nC
Gate to Source Gate Charge	Q _{gs}		-	7.2	-	
Gate to Drain "Miller" Charge	Q _{gd}		-	10.4	-	

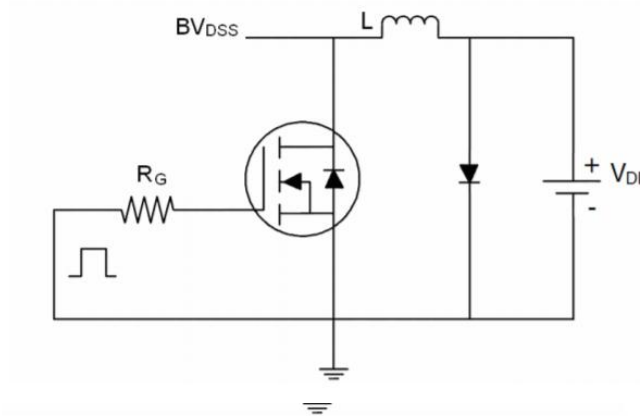
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _{DS} =30A	-	-	1.2	V
Reverse Recovery Time	t _{rr}	T _J =25°C, I _F =30A	-	28	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt=100A/us	-	21	-	nC

Notes:

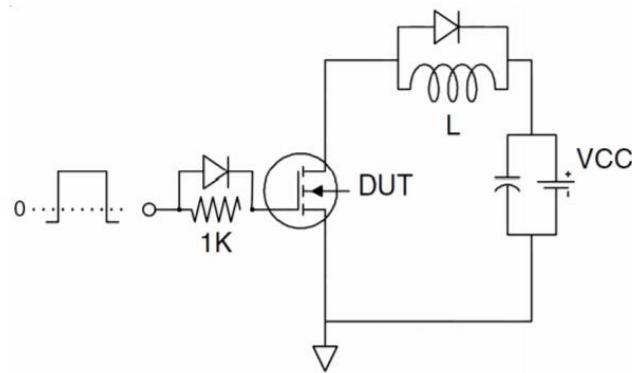
- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, t_s≤10sec.
- 3: Pulse width ≤ 300μs, duty cycle ≤ 2%.
- 4: EAS condition: L=0.5mH, V_{DD}=15V, V_G=10V, V_{GATE}=30V, Start T_J=25°C.

Test Circuit

1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit

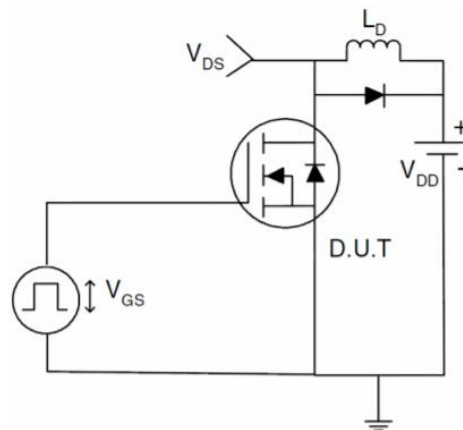


Figure 1: Output Characteristics

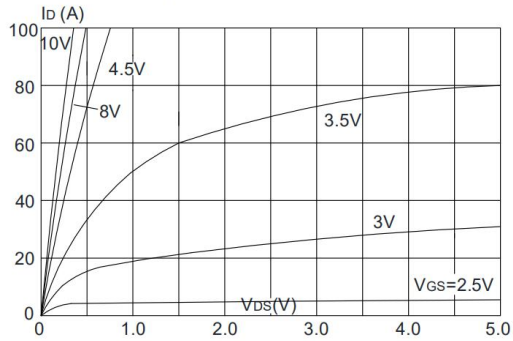


Figure 2: Typical Transfer Characteristics

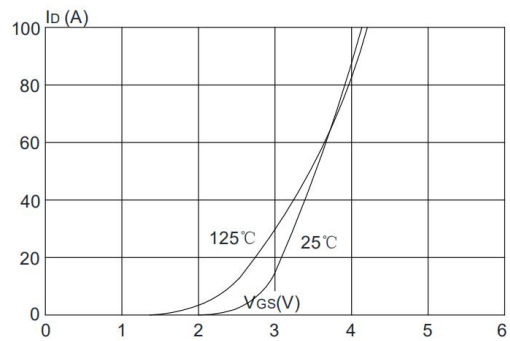


Figure 3: On-resistance vs. Drain Current

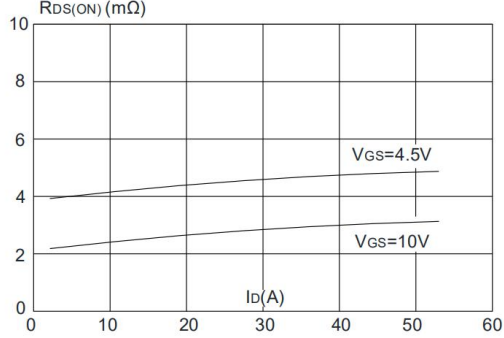


Figure 4: Body Diode Characteristics

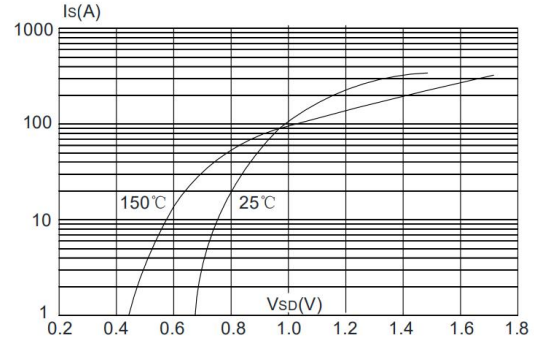


Figure 5: Gate Charge Characteristics

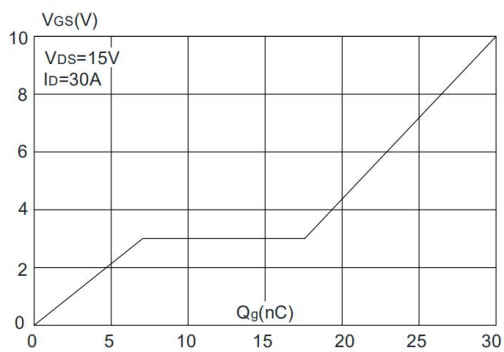


Figure 6: Capacitance Characteristics

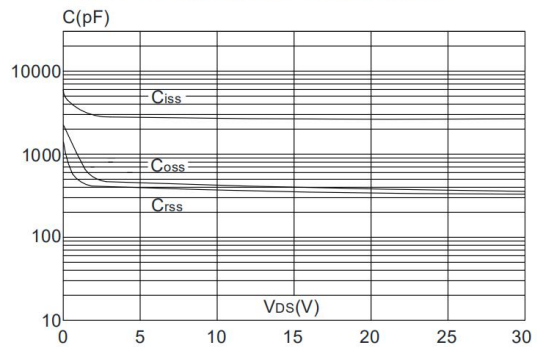


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

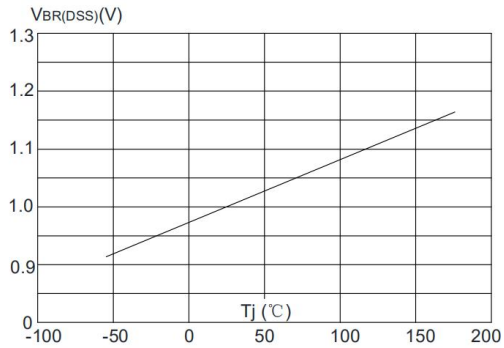


Figure 8: Normalized on Resistance vs. Junction Temperature

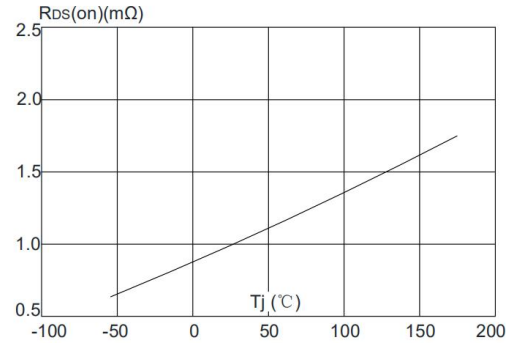


Figure 9: Maximum Safe Operating Area

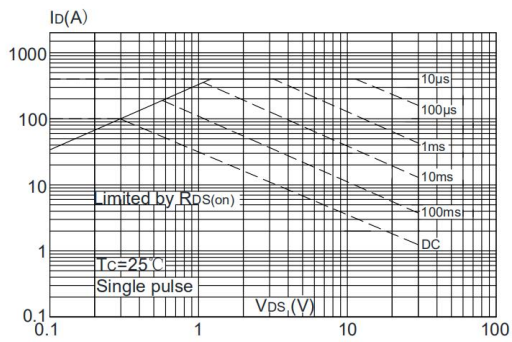


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

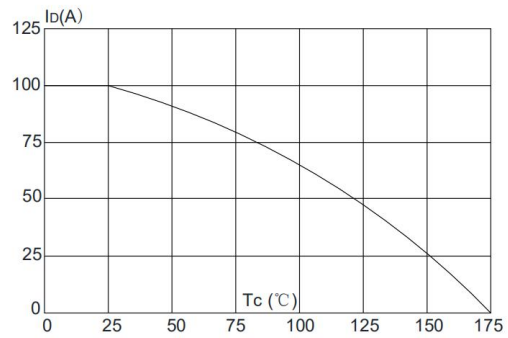
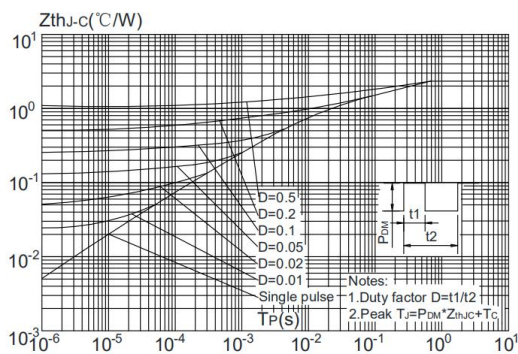
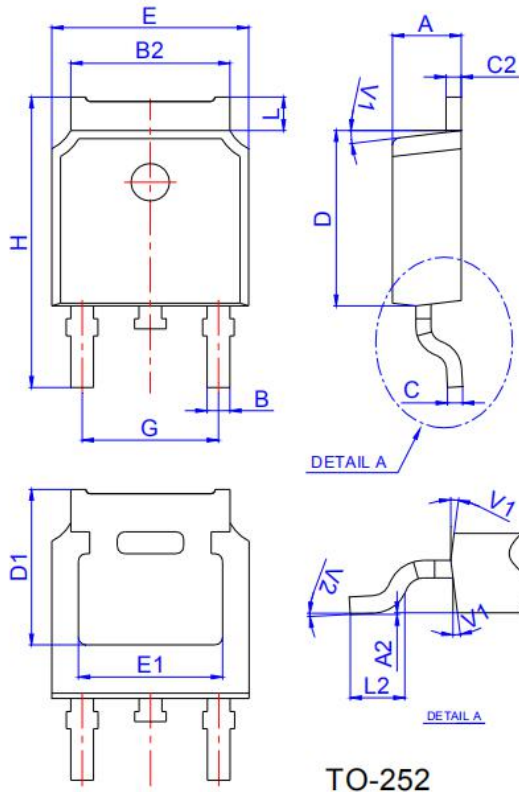


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Package Mechanical Data



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

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