20V, 90A
N-CHANNEL POWER MOSFET

■Features

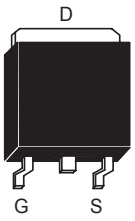
$R_{DS(ON)}$<4.0mΩ @ V_{GS}=4.5V
$R_{DS(ON)}$<6.0mΩ @ V_{GS}=2.5V
Advanced Trench Technology
Provide Excellent $R_{DS(ON)}$ and Low Gate Charge
Lead free product is acquired

■Application
Load Switch
PWM Application
Power management

Product Summary

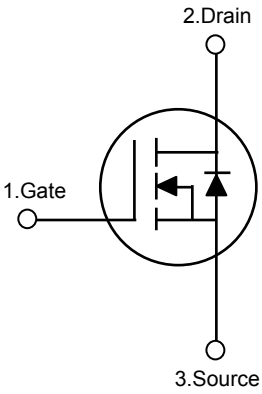
V_{DS}	20	V
$R_{DS(ON)}$	4	mΩ
I_D	90	A

100% UIS TESTED !
100% ΔVds TESTED !



TO-252

Marking



ORDERING INFORMATION

Order Number	Package	Pin Assignment			Packing	Reel Size	Reel	Per Carton
		1	2	3			Pcs	Pcs
HPD032N02STA	TO-252	G	D	S	Tape Reel	13 Inch	2500	25000

Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter		Max.	Units
V_{DSS}	Drain-Source Voltage		20	V
V_{GSS}	Gate-Source Voltage		±12	
I_D	Continuous Drain Current	T_C=25℃	90	A
		T_C=100℃	59	
I_{DM}	Pulsed Drain Current note1		360	
E_{AS}	Single Pulsed Avalanche Energy note2		110	mJ
P_D	Power Dissipation	T_C=25℃	81	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		1.85	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	℃

Electrical Characteristics（T_C=25℃, unless otherwise specified）

Off Characteristic

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	20	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V	--	--	1	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS}=0V, V_{GS}=±12V	--	--	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	0.4	0.7	1	V
$R_{DS(on)}$	Static Drain-Source on-Resistance（note3）	V_{GS}=4.5V, I_D=30A	--	2.8	4	mΩ
		V_{GS}=2.5V, I_D=20A	--	4	6	

Dynamic Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	V_{DS}=10V V_{GS}=0V f=1.0MHz	--	3200	--	pF
C_{oss}	Output Capacitance		--	460	--	
C_{rss}	Reverse Transfer Capacitance		--	445	--	
Q_g	Total Gate Charge	V_{DS}=10V I_D=30A V_{GS}=4.5V R_G=1.8Ω	--	48	--	nC
Q_{gs}	Gate-Source Charge		--	3.6	--	
Q_{gd}	Gate-Drain(“Miller”) Charge		--	19	--	

Electrical Characteristics（T_C=25℃, unless otherwise specified）

Switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=10V I_D=30A R_{GEN}=1.8Ω V_{GS}=4.5V	--	9.7	--	nS
t_r	Turn-on Rise Time		--	37	--	
$t_{d(off)}$	Turn-off Delay Time		--	63	--	
t_f	Turn-off Fall Time		--	52	--	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Maximum Continuous Drain to Source Diode Forward Current		--	--	90	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		--	--	360	
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S=30A	--	--	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A dI/dt=100A/μs	--	23	--	nS
Q_{rr}	Body Diode Reverse Recovery Charge		--	10	--	nC

Notes:

1、Repetitive Rating：Pulse Width Limited by Maximum Junction Temperature

2、EAS condition：T_J=25℃，V_{DD}=15V，V_G=4.5V，R_G=25Ω，L=0.5mH，I_{AS}=21A

3、Pulse Test：Pulse Width ≤300μs，Duty Cycle ≤0.5%

Typical Performance Characteristics

Figure1: Output Characteristics

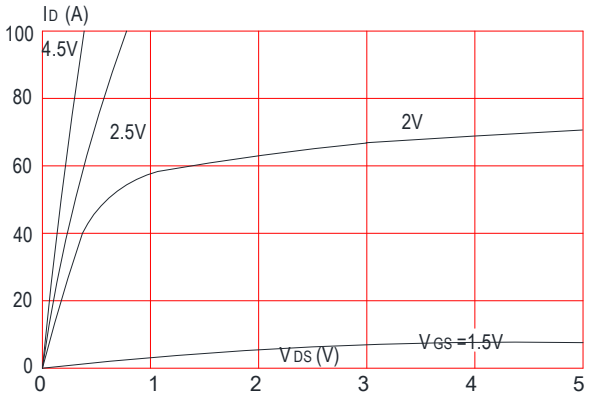


Figure2: Typical Transfer Characteristics

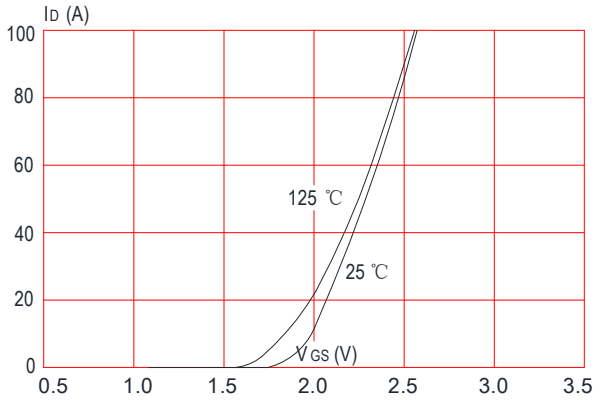


Figure3: On-resistance vs. Drain Current

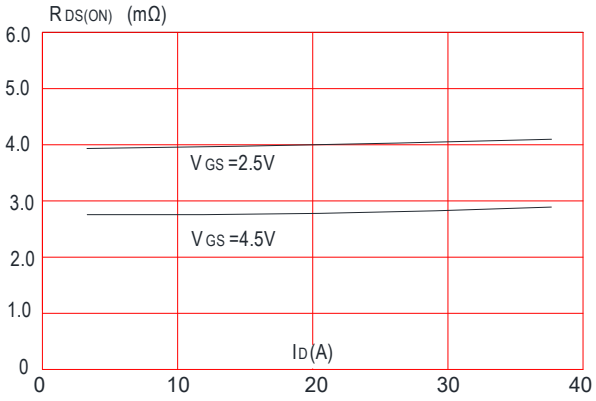


Figure4:: Body Diode Characteristics

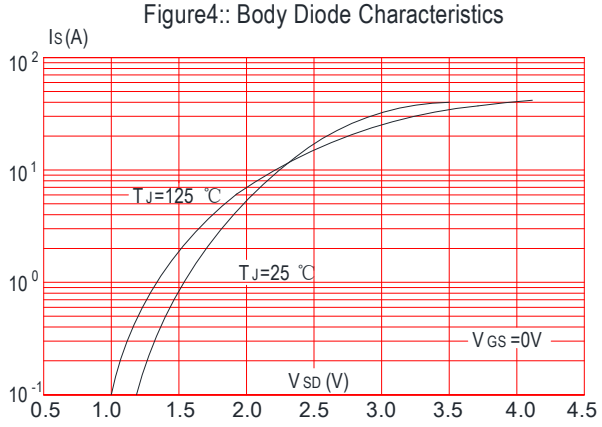


Figure5: Gate Charge Characteristics

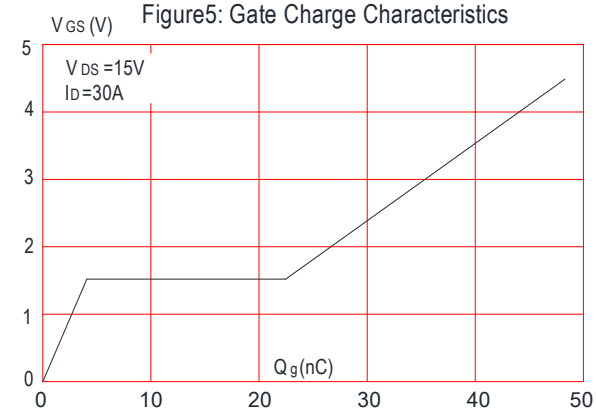


Figure6: Capacitance Characteristics

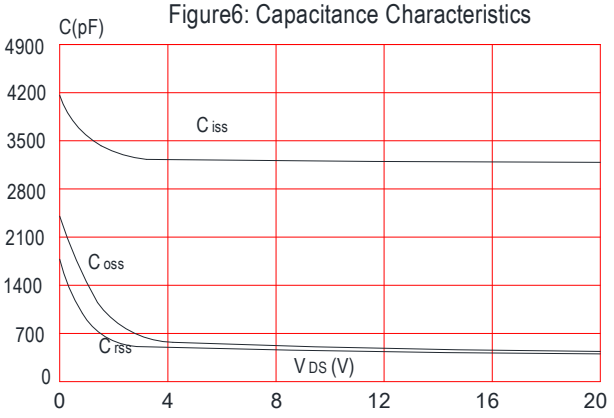


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

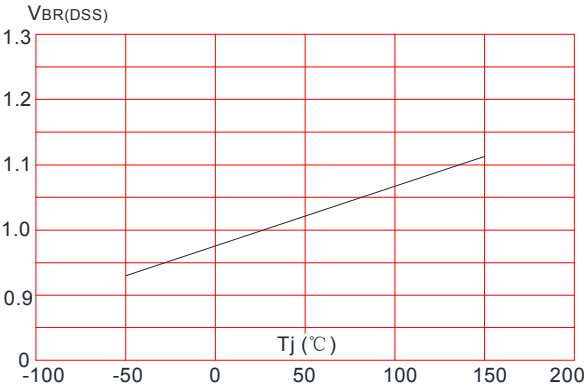


Figure 8: Normalized on Resistance vs. Junction Temperature

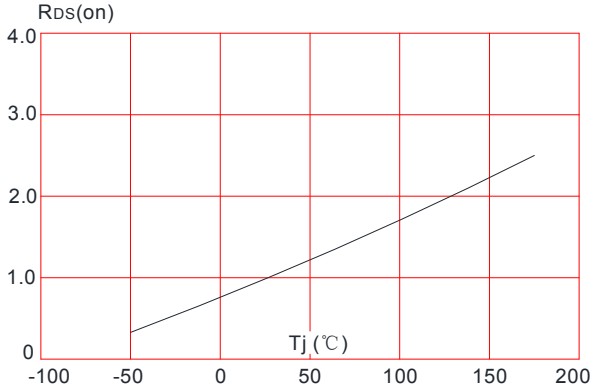


Figure 9: Maximum Safe Operating Area

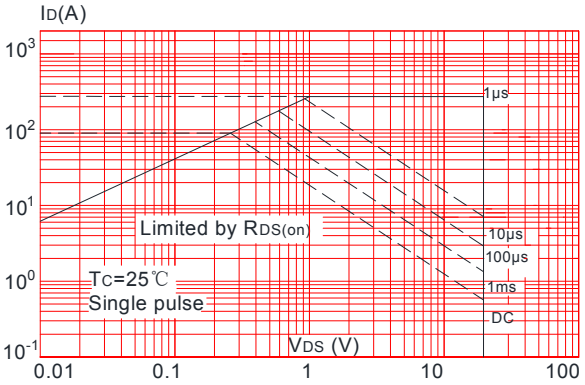


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

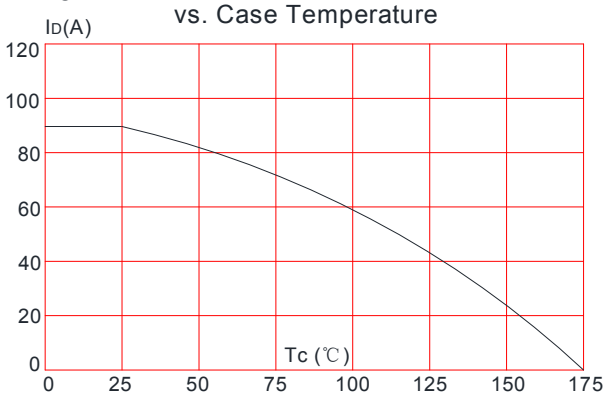
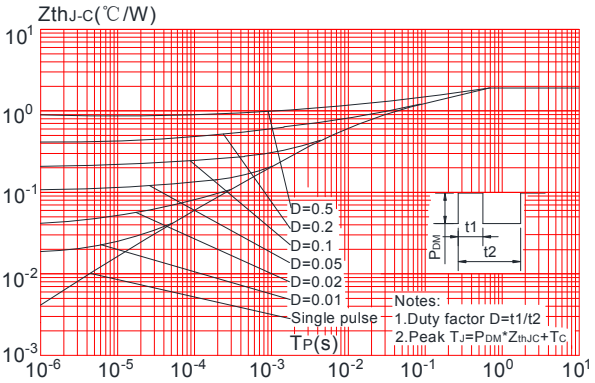


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit

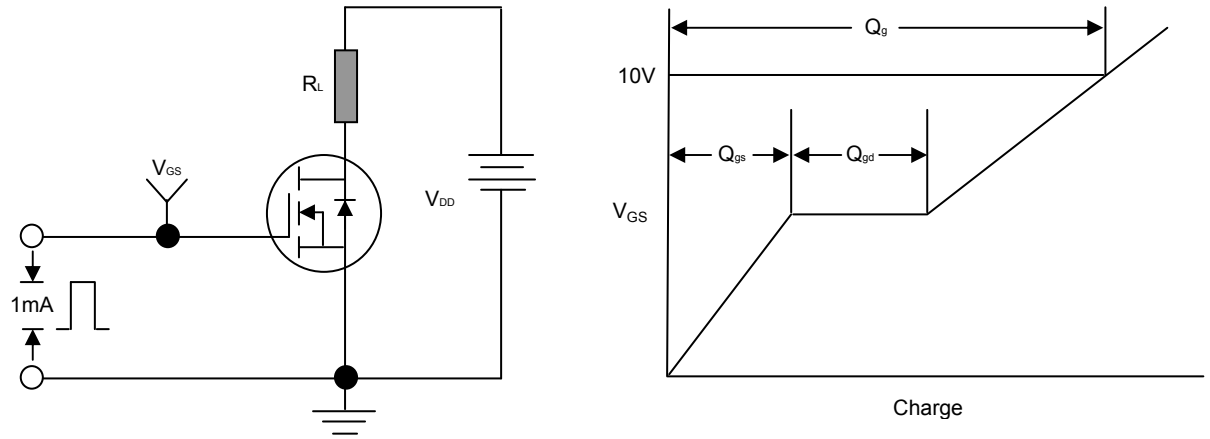


Fig-1: Gate Charge Test Circuit & Waveform

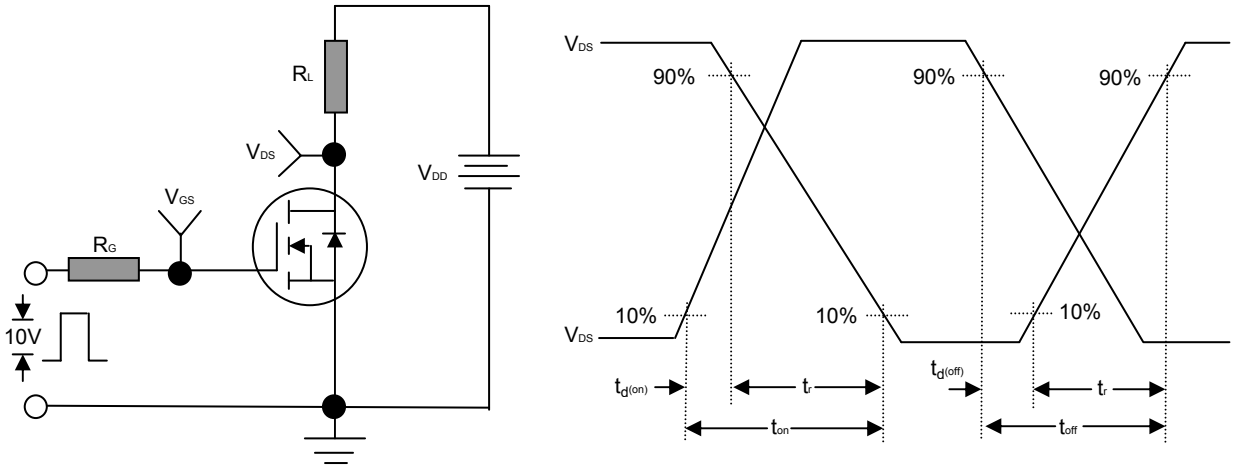


Fig-2: Resistive Switching Test Circuit & Waveforms

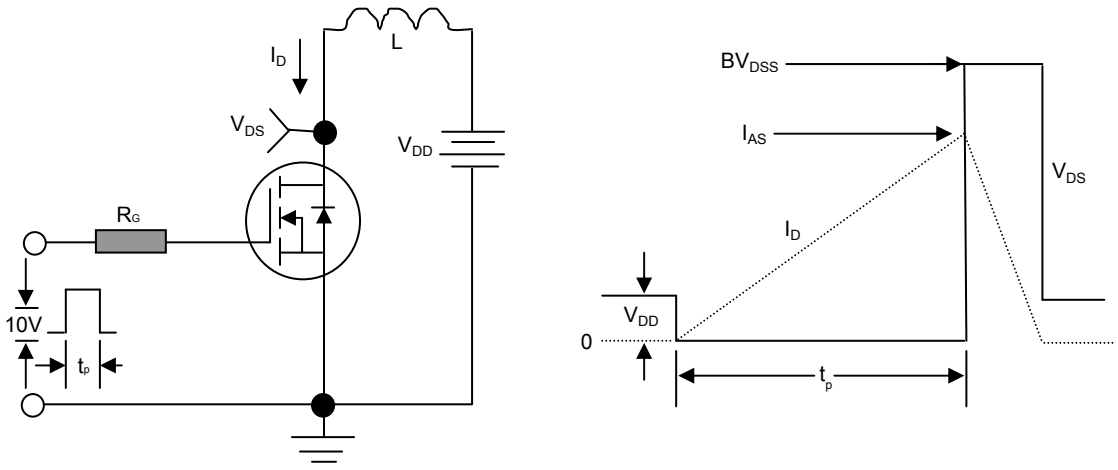
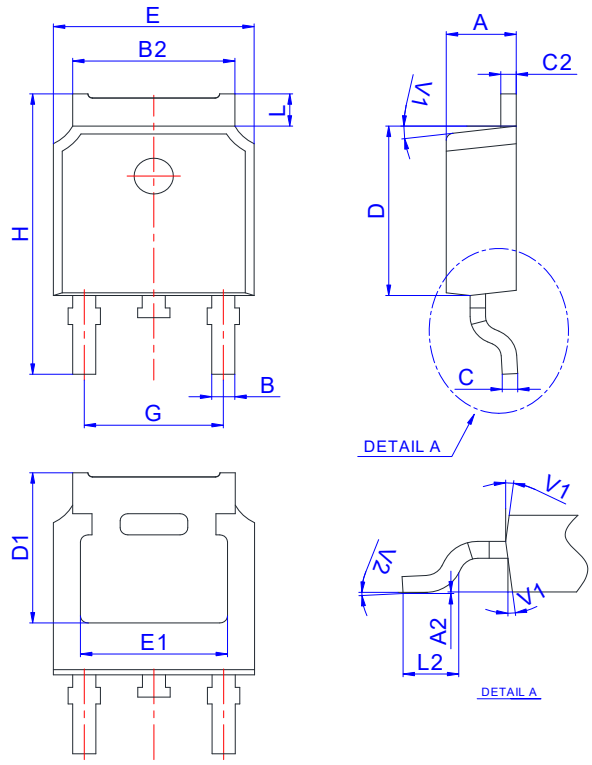


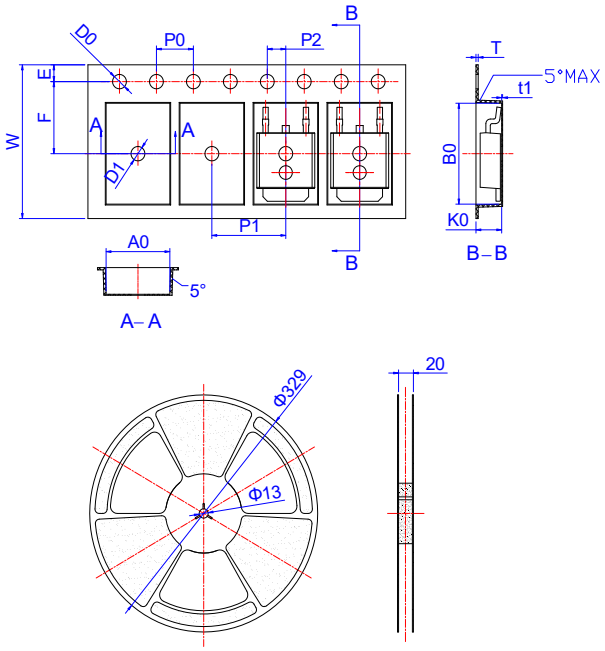
Fig-3: Unclamped Inductive Switching Test Circuit & Waveforms

TO-252（DPAK）PACKAGE MECHANICAL DATA （mm & inch）



REF.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	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	5.30 REF		0.209 REF	
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	10.7	0.374	0.421
L	1.09	1.21	0.043	0.048
L2	1.35	1.65	0.053	0.065
V1	7° TYP.		7° TYP.	
V2	0°	6°	0°	6°

TO-252 Reel Specification



REF.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
W	15.90	16.10	0.626	0.634
E	1.65	1.85	0.065	0.073
F	7.40	7.60	0.291	0.299
D0	1.40	1.60	0.055	0.063
D1	1.40	1.60	0.055	0.063
P0	3.90	4.10	0.154	0.161
P1	7.90	8.10	0.311	0.319
P2	1.90	2.10	0.075	0.083
A0	6.85	7.00	0.270	0.276
B0	10.45	10.60	0.411	0.417
K0	2.63	2.88	0.105	0.113
T	0.24	0.27	0.009	0.011
t1	0.10		0.004	
10P0	39.80	40.20	1.567	1.583

Manufacturers version information
2020-07-13， HAOHAI ™ Product Data-1.0
2021-08-19， HAOHAI ™ Product Data-1.1

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