



Description

The IPD053N06NATMA1 can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-252-2L, which accords with the RoHS standard.

General Features

$V_{DS} = 60V$ $I_D = 120A$

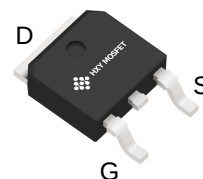
$R_{DS(ON)} < 5.9m\Omega$ @ $V_{GS}=10V$

Application

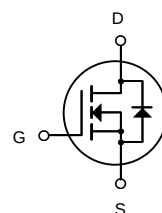
Battery protection

Load switch

Uninterruptible power supply



TO-252-2L
(DPAK)



N-Channel MOSFET

Ordering Information

Product ID	Pack	Brand	Qty(PCS)
IPD053N06NATMA1	TO-252-2L(DPAK)	HXY MOSFET	2500

Absolute Maximum Ratings $T_c=25^{\circ}C$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_c=25^{\circ}C$	Continuous Drain Current, V_{GS} @ 10V	120	A
$I_D@T_c=100^{\circ}C$	Continuous Drain Current, V_{GS} @ 10V	72	A
I_{DM}	Pulsed Drain Current	600	A
EAS	Single Pulse Avalanche Energy	272	mJ
$P_D@T_c=25^{\circ}C$	Total Power Dissipation	125	W
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
$R_{\theta JC}$	Thermal Resistance Junction-Case	1	$^{\circ}C/W$



Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to $25^\circ\text{C}, I_D=1\text{mA}$	---	---	---	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=24A$	---	4.5	5.9	$m\Omega$
		$V_{GS}=4.5V, I_D=15A$	---	---	---	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	2.4	3	3.6	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	$mV/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=60V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=60V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	---	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=10V, I_D=24A$	---	---	---	S
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	---	---	Ω
Q_g	Total Gate Charge	$V_{DS}=30V, V_{GS}=10V, I_D=36A$	---	98	---	nC
Q_{gs}	Gate-Source Charge		---	13	---	
Q_{gd}	Gate-Drain Charge		---	30	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{GS}=10V, V_{DS}=30V,$ $R_g=1.8\Omega, I_D=36A$	---	11	---	ns
T_r	Rise Time		---	8	---	
$T_{d(off)}$	Turn-Off Delay Time		---	47	---	
T_f	Fall Time		---	14	---	
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$	---	5066	---	pF
C_{oss}	Output Capacitance		---	472	---	
C_{rss}	Reverse Transfer Capacitance		---	283	---	
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	120	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=36A, T_J=25^\circ\text{C}$	---	---	1.2	V
t_{rr}	Reverse Recovery Time	$I_F=36A, di/dt=100A/\mu s$,	---	26	---	nS
Q_{rr}	Reverse Recovery Charge	$T_J=25^\circ\text{C}$	---	47	---	nC

Note :

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2.EAS condition: $T_J=25^\circ\text{C}, V_{DD}=30V, V_G=10V, R_g=25\Omega, L=0.5\text{mH}, I_{AS}=40A$
- 3.Repetitive Rating: Pulse width limited by maximum junction temperature.



Typical Performance Characteristics

Figure 1. Output Characteristics

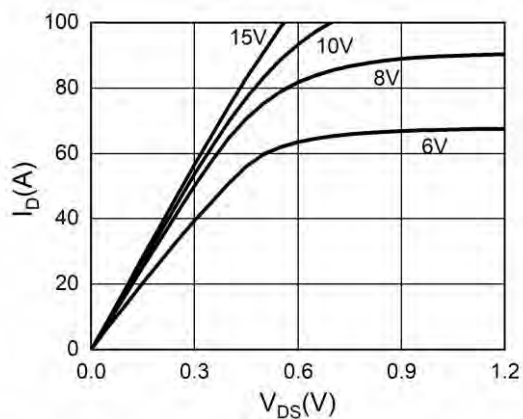


Figure 2. Transfer Characteristics

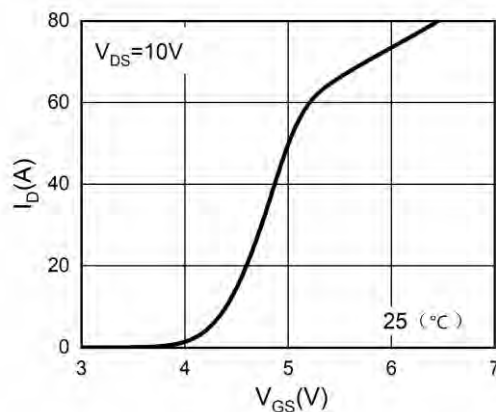


Figure 3. Power Dissipation

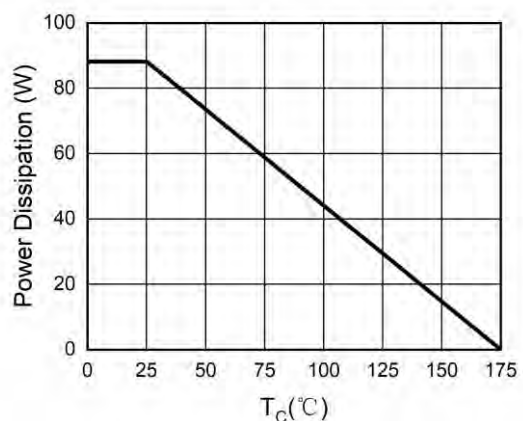


Figure 4. Drain Current

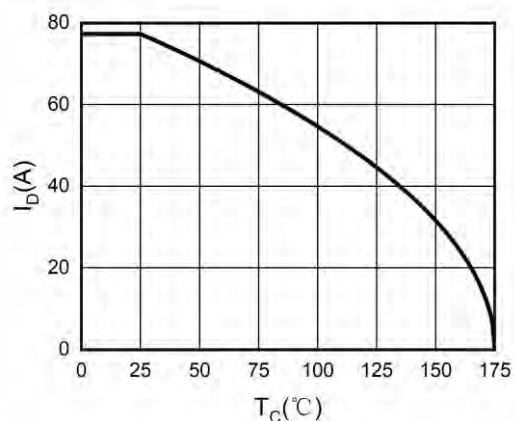


Figure 5. BV_{DSS} vs Junction Temperature

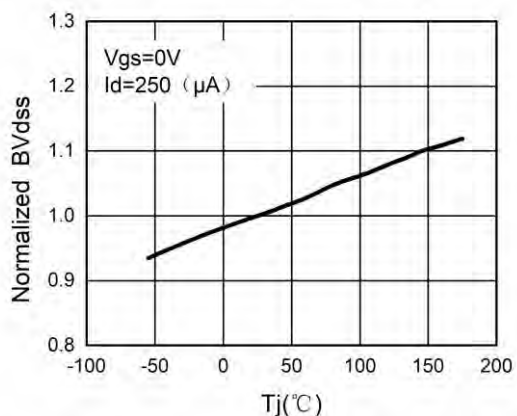


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

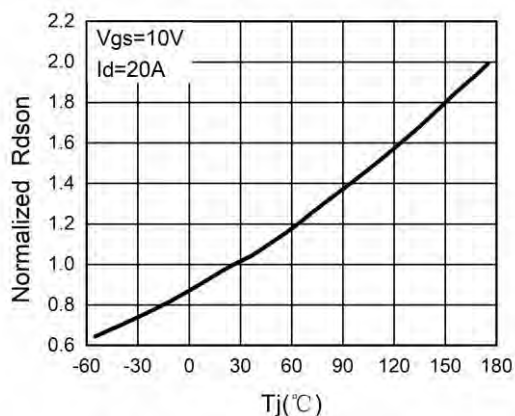




Figure 7. Gate Charge Waveforms

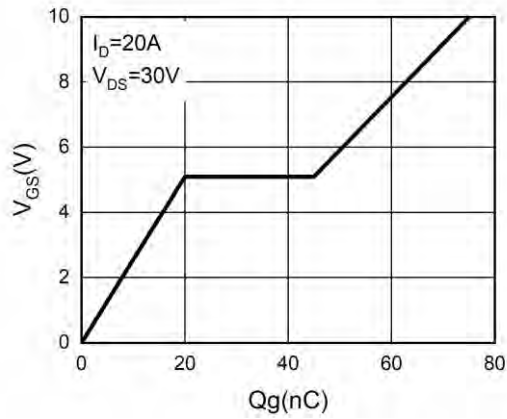


Figure 8. Capacitance

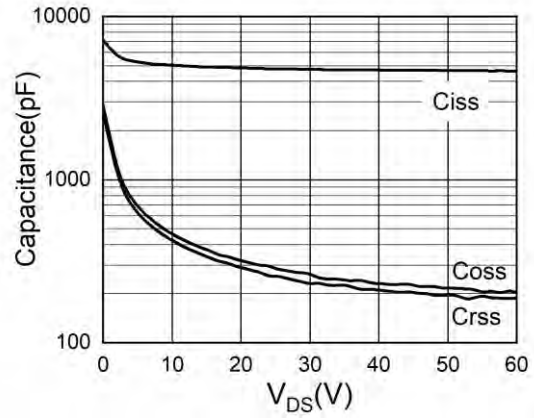


Figure 9. Body-Diode Characteristics

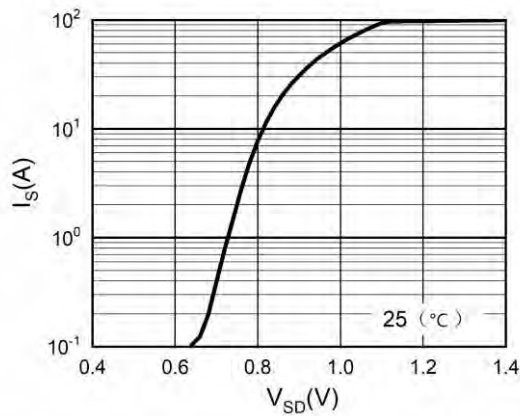
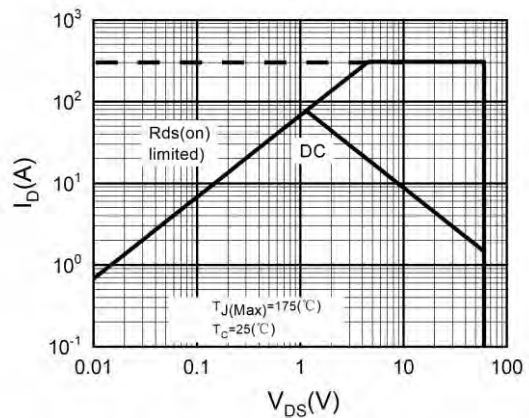


Figure 10. Maximum Safe Operating Area





Test Circuits & Waveforms

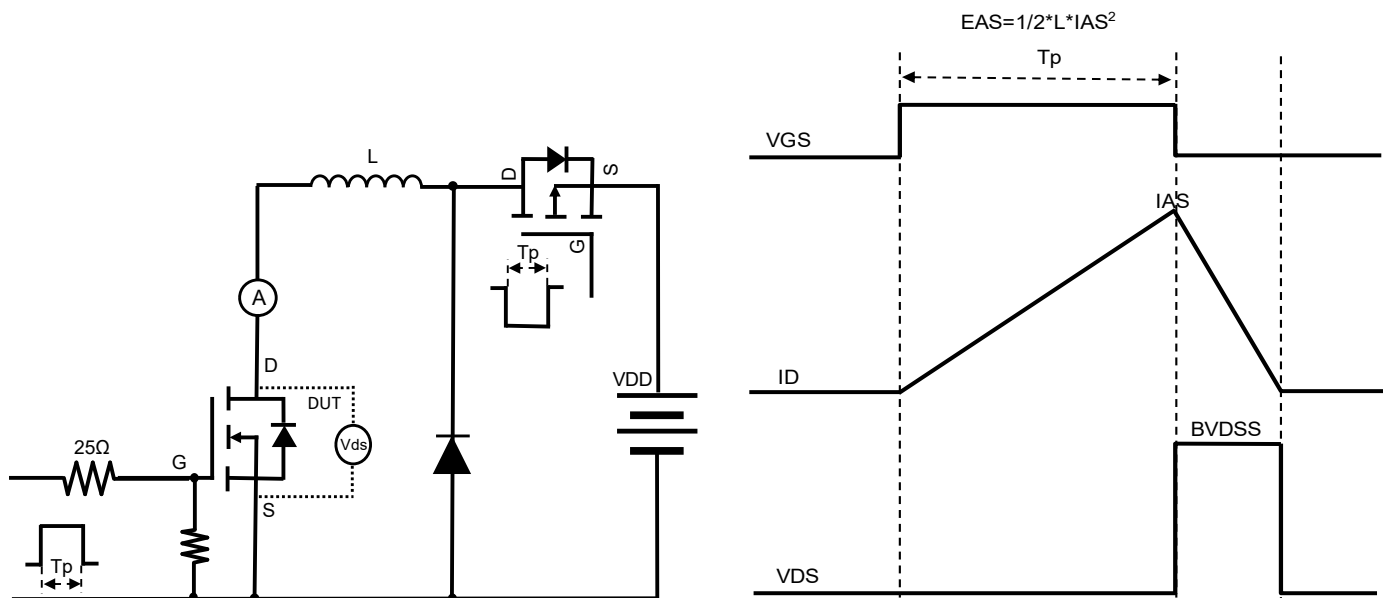


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

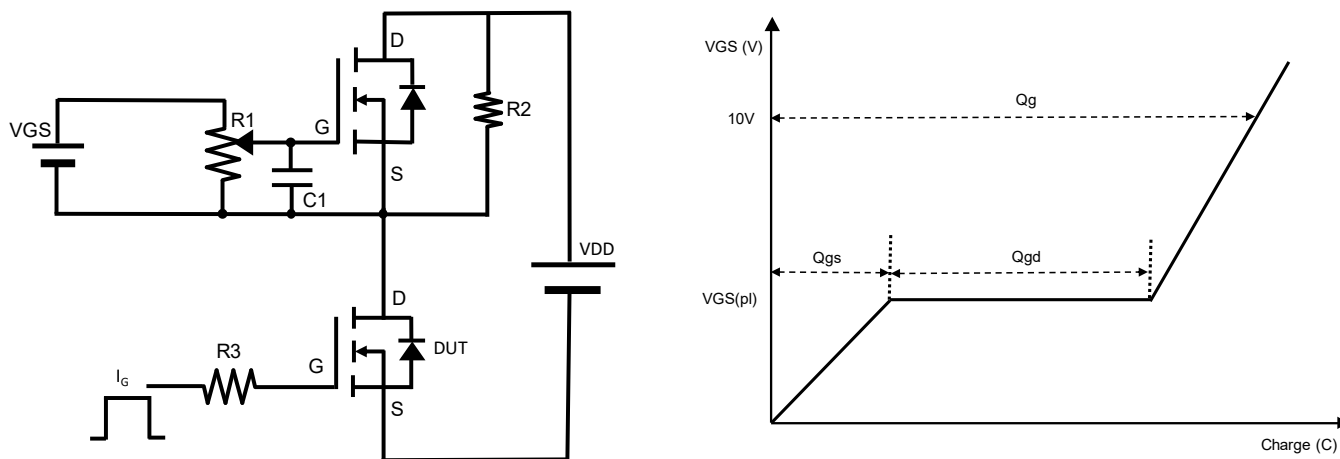
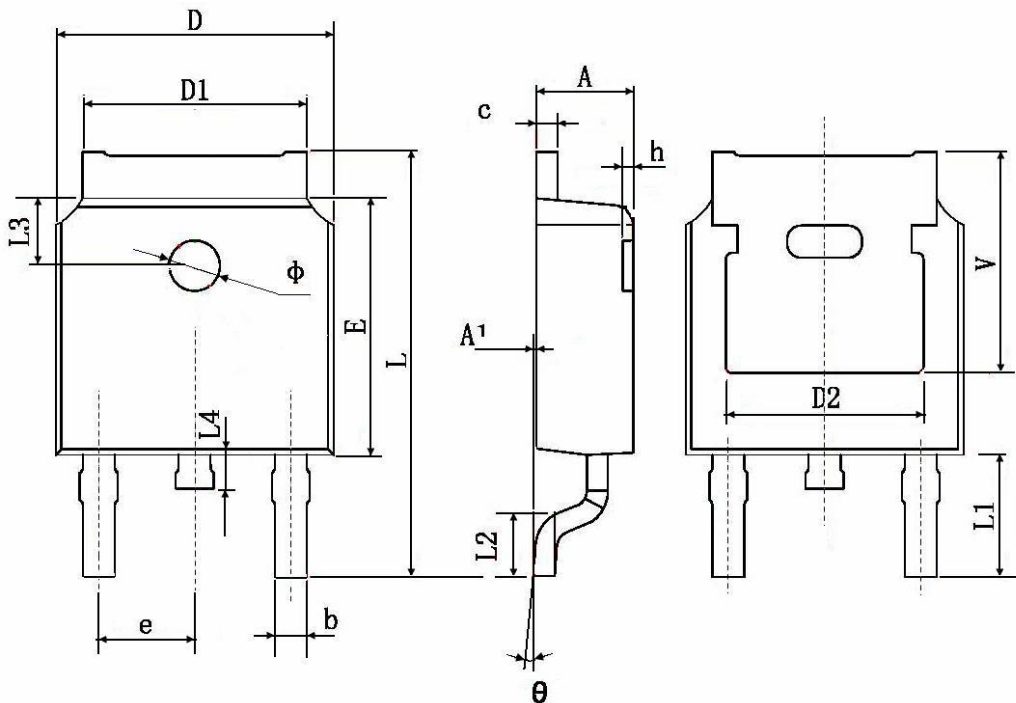


Figure B. Gate Charge Test Circuit & Waveform



N-Channel Enhancement Mode MOSFET

TO-252-2L(DPAK) Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	0.483 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	



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