



## Description

The IPD90N06S405ATMA1 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

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

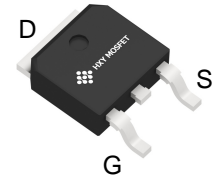
$R_{DS(ON)} < 5.9m\Omega @ V_{GS}=10V$

## Application

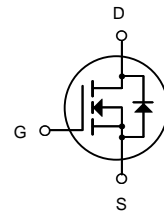
Battery protection

Load switch

Uninterruptible power supply



TO-252-2L  
(DPAK)



N-Channel MOSFET

## Ordering Information

Product ID	Pack	Brand	Qty(PCS)
IPD90N06S405ATMA1	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	$\pm 20$	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 <sup>2</sup>	$V_{GS}=10V, I_D=24A$	---	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		---	---	---	$\text{mV}/^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=60V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu\text{A}$
		$V_{DS}=60V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	---	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
gfs	Forward Transconductance	$V_{DS}=10V, I_D=24A$	---	---	---	S
$R_g$	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	---	---	$\Omega$
$Q_g$	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 <sup>1,4</sup>	$V_G=V_D=0V, \text{Force Current}$	---	---	120	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=36A, T_J=25^\circ\text{C}$	---	---	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

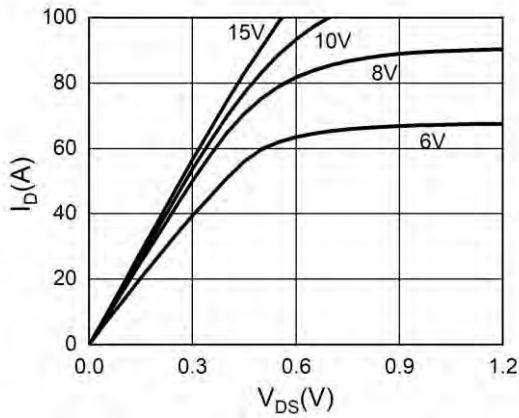


Figure 2. Transfer Characteristics

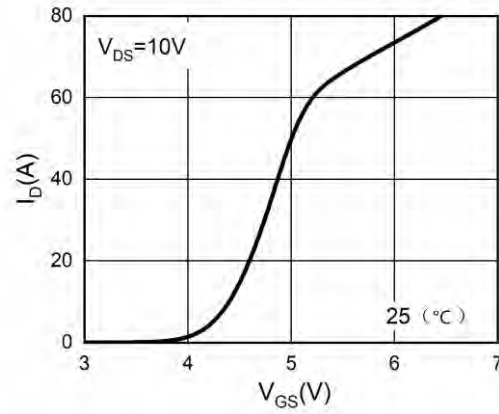


Figure 3. Power Dissipation

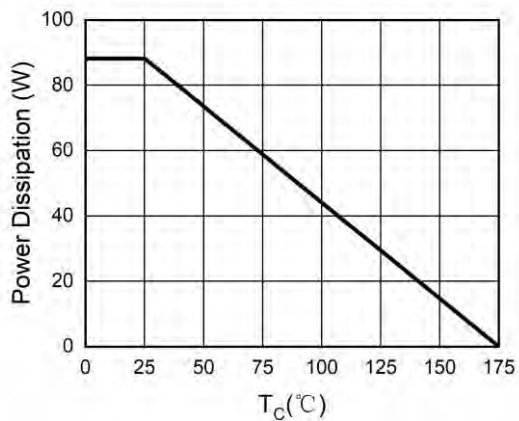


Figure 4. Drain Current

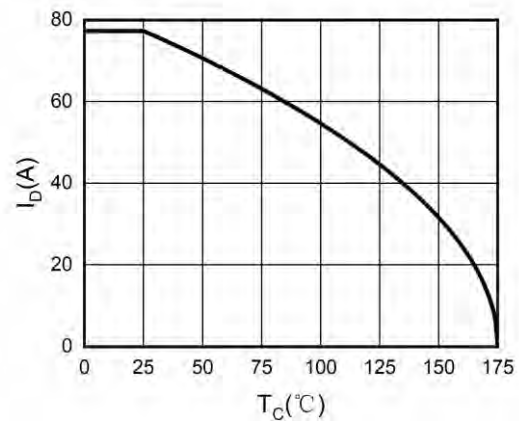


Figure 5.  $BV_{DSS}$  vs Junction Temperature

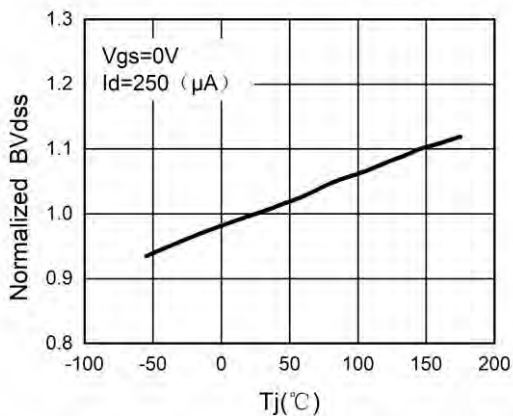


Figure 6.  $R_{DS(ON)}$  vs Junction Temperature

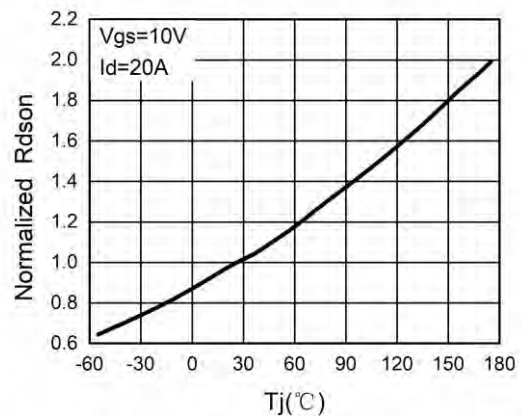




Figure 7. Gate Charge Waveforms

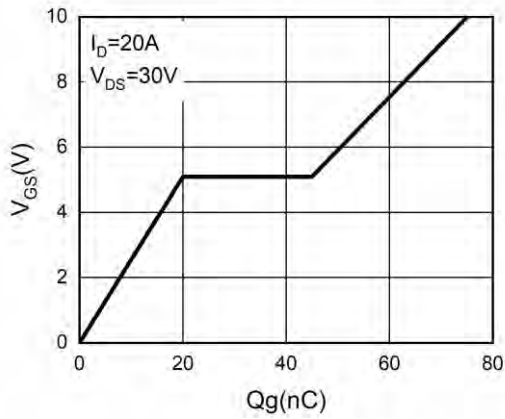


Figure 8. Capacitance

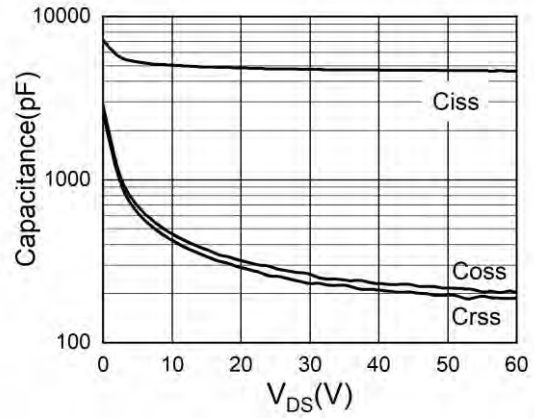


Figure 9. Body-Diode Characteristics

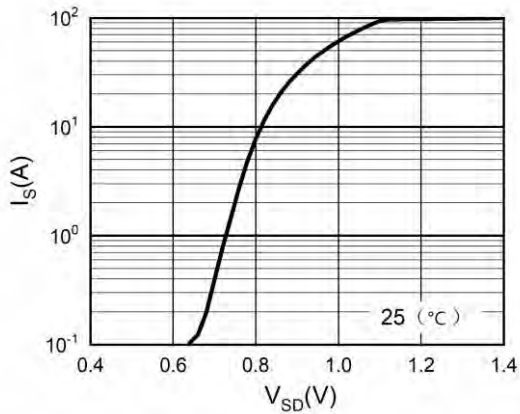
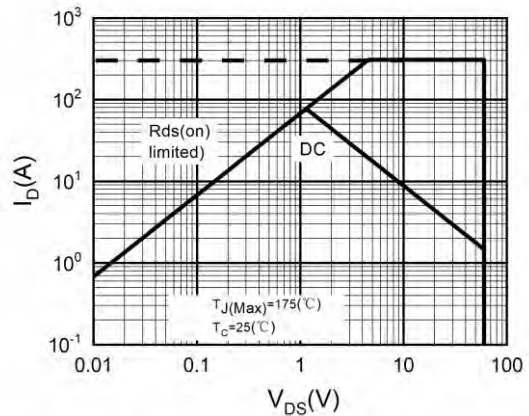
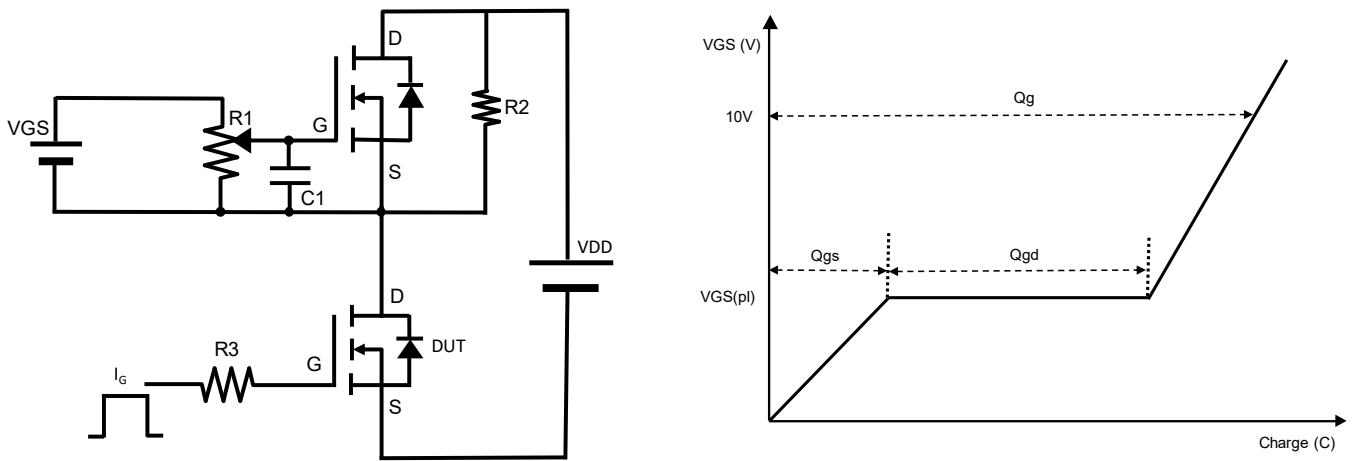
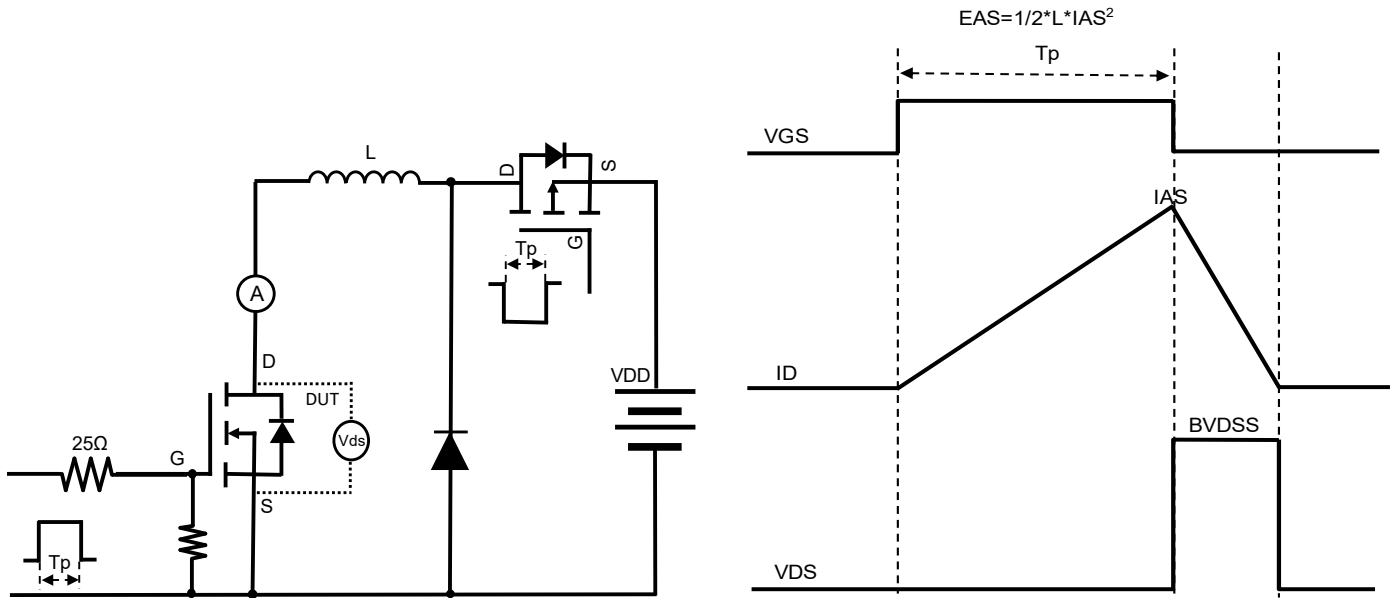


Figure 10. Maximum Safe Operating Area





### Test Circuits & Waveforms







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