

## Silicon N-Channel Planar Power MOSFET

### Description

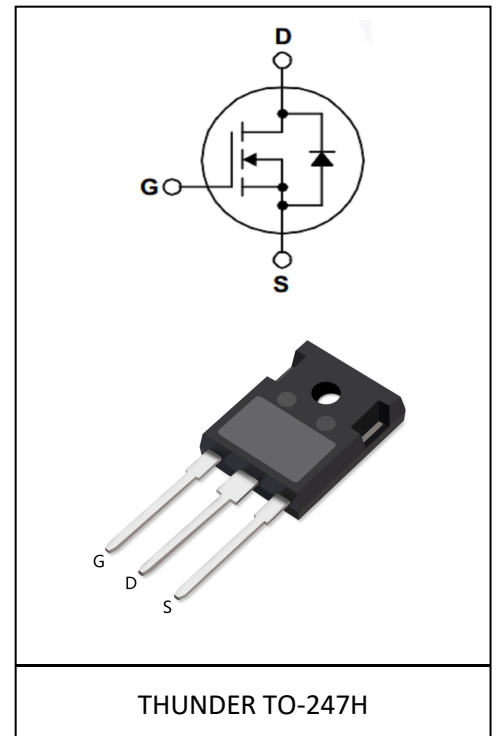
The IRFP460M utilizes the latest processing techniques to achieve low on-resistance per silicon area. Additional features of this MOSFET are 150°C operating junction temperature and high repetitive peak current capability. These features combine to make this MOSFET a highly efficient, robust and reliable device for PDP driving applications. It can be used in a wide variety of applications.

### General Features

- $V_{DS}=500V, I_D=20A$
- Low ON Resistance,  $R_{DS(ON)}=160m\Omega @ V_{GS}=10V, I_D=10A$
- Low reverse transfer capacitance
- Low Qg for fast response
- Short fall & rise times for fast switching
- 100% single pulse avalanche energy Test

### Application

- Power switching application
- Digital amplifier
- Adapter and charger



### Product Summary

$V_{DS}$	500V
$R_{DS(on)}$	160m $\Omega$
$I_D$	20A

### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	500	V
Continuous drain current $T_C = 25^\circ C$ (Silicon limit)	$I_D$	20	A
Pulsed drain current ( $T_C = 25^\circ C$ , $t_p$ limited by $T_{jmax}$ )	$I_{DM}$	80	A
Avalanche energy, single pulse ( $L=10mH$ , $R_g=25\Omega$ )	$E_{AS}$	2698	mJ
Gate-Source voltage	$V_{GS}$	$\pm 30$	V
Power dissipation ( $T_C = 25^\circ C$ )	$P_D$	227	W
Operating junction and storage temperature	$T_j, T_{stg}$	-55...+150	$^\circ C$

### Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	$R_{thJC}$	0.55	°C/W
Thermal resistance, junction – ambient(min. footprint)	$R_{thJA}$	40	

### Electrical Characteristic (at $T_j = 25\text{ °C}$ , unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

### Static Characteristic

Drain-source breakdown voltage	$BV_{DSS}$	500	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	2.0	-	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	$I_{DSS}$	-	-	1	$\mu A$	$V_{DS}=500V, V_{GS}=0V$ $T_j=25\text{ °C}$
		-	-	10	$\mu A$	$V_{DS}=400V, V_{GS}=0V$ $T_j=125\text{ °C}$
Gate-source leakage current	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS}=\pm 30V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	160	210	m $\Omega$	$V_{GS}=10V, I_D=10A$
Transconductance	$g_{fs}$	-	28	-	S	$V_{DS}=20V, I_D=10A$

### Dynamic Characteristic

Input Capacitance	$C_{iss}$	-	5650	-	pF	$V_{GS}=0V, V_{DS}=25V,$ $f=1MHz$
Output Capacitance	$C_{oss}$	-	410	-		
Reverse Transfer Capacitance	$C_{rss}$	-	1.5	-		
Gate Total Charge	$Q_g$	-	70	-	nC	$V_{GS}=10V, V_{DS}=400V,$ $I_D=20A$
Gate-Source charge	$Q_{gs}$	-	22	-		
Gate-Drain charge	$Q_{gd}$	-	28	-		
Turn-on delay time	$t_{d(on)}$	-	45	-	ns	$V_{DD}=250V, I_D=20A,$ $R_G=25\Omega$
Rise time	$t_r$	-	105	-		
Turn-off delay time	$t_{d(off)}$	-	160	-		
Fall time	$t_f$	-	82	-		
Gate resistance	$R_G$	-	0.4	-	$\Omega$	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$

### Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	$V_{SD}$	-	-	1.4	V	$V_{GS}=0V, I_{DS}=20A$
Body Diode Continuous Forward Current	$I_S$	-	-	20	A	$T_C=25^\circ C$
Body Diode Reverse Recovery Time	$t_{rr}$	-	550	-	ns	$T_C=25^\circ C, I_S=20A,$ $di/dt=100A/us$
Body Diode Reverse Recovery Charge	$Q_{rr}$	-	8.0	-	$\mu C$	

### Typical Performance Characteristics

Fig 1: Output Characteristics

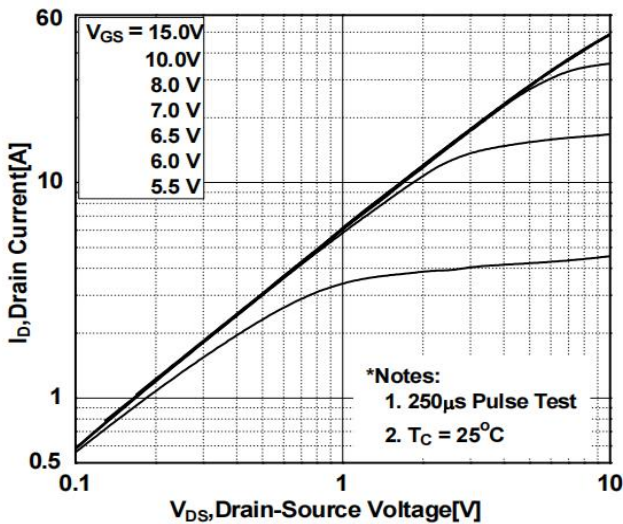


Fig 2: Transfer Characteristics

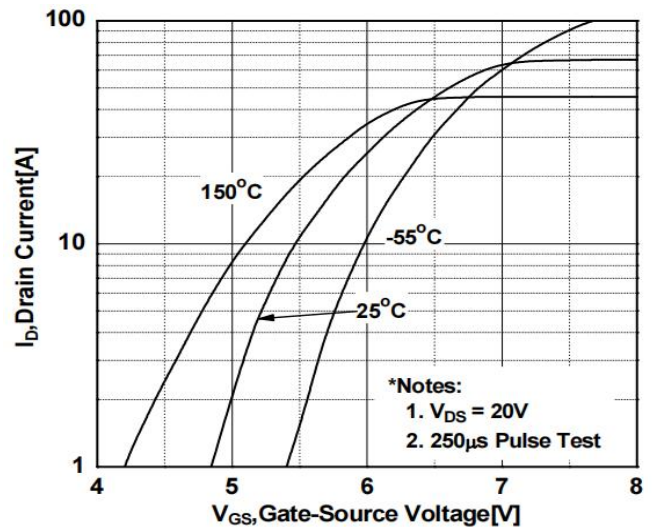


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

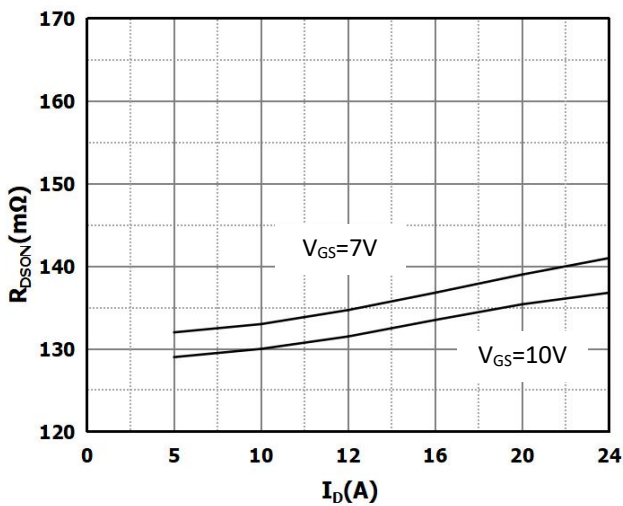


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

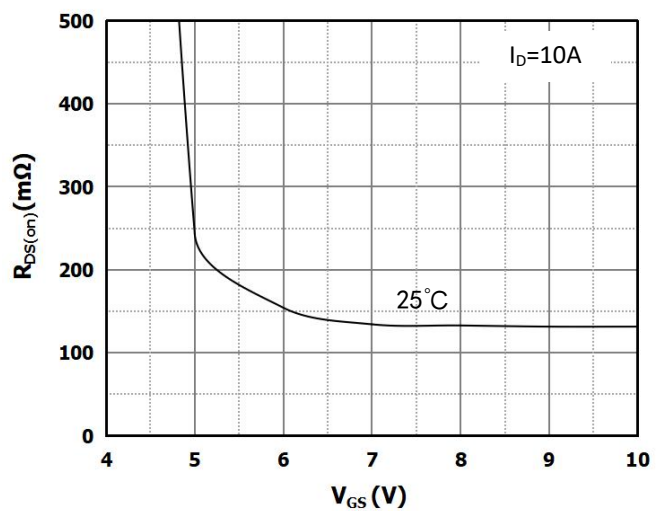


Fig 5: Rds(on) vs. Temperature

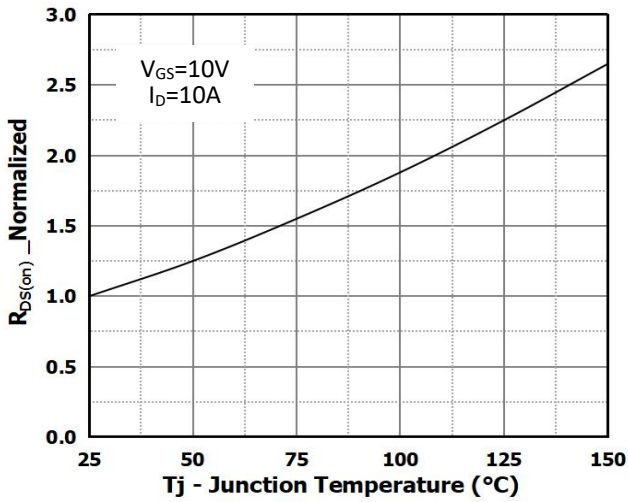


Fig 6: Capacitance Characteristics

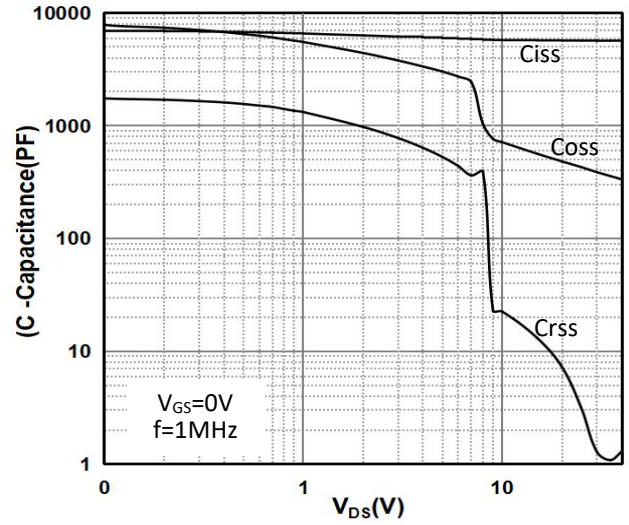


Fig 7: Gate Charge Characteristics

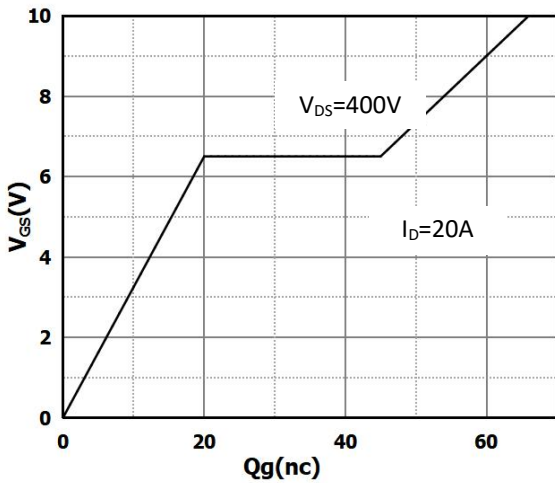


Fig 8: Body-diode Forward Characteristics

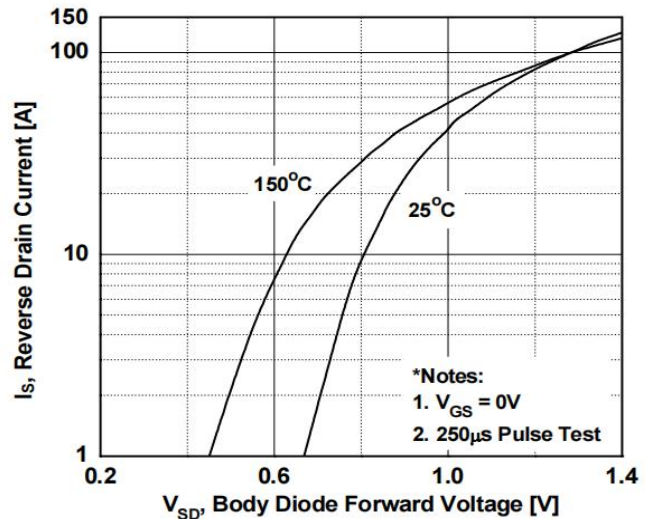


Fig 9: Power Dissipation

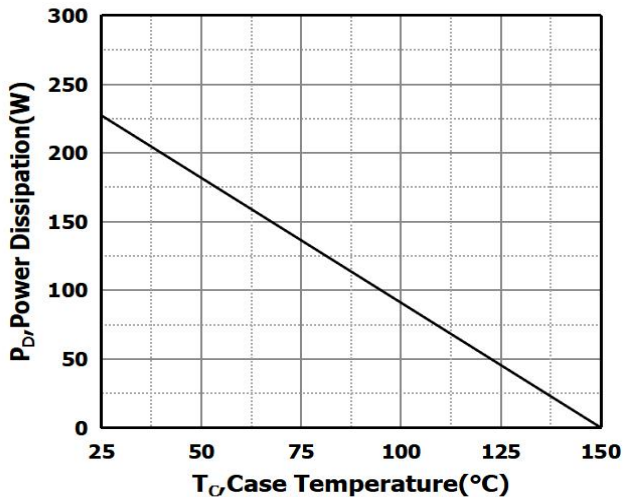


Fig 10: Drain Current Derating

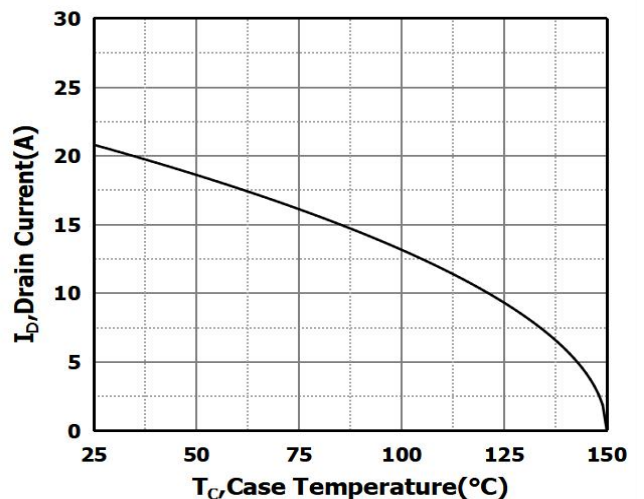


Fig 11: Safe Operating Area

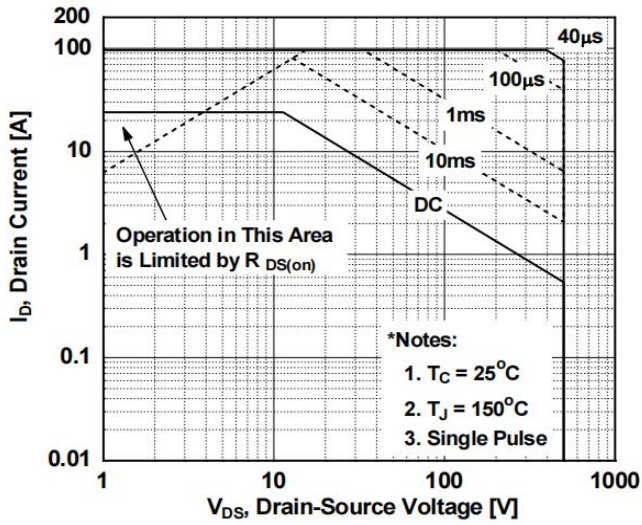
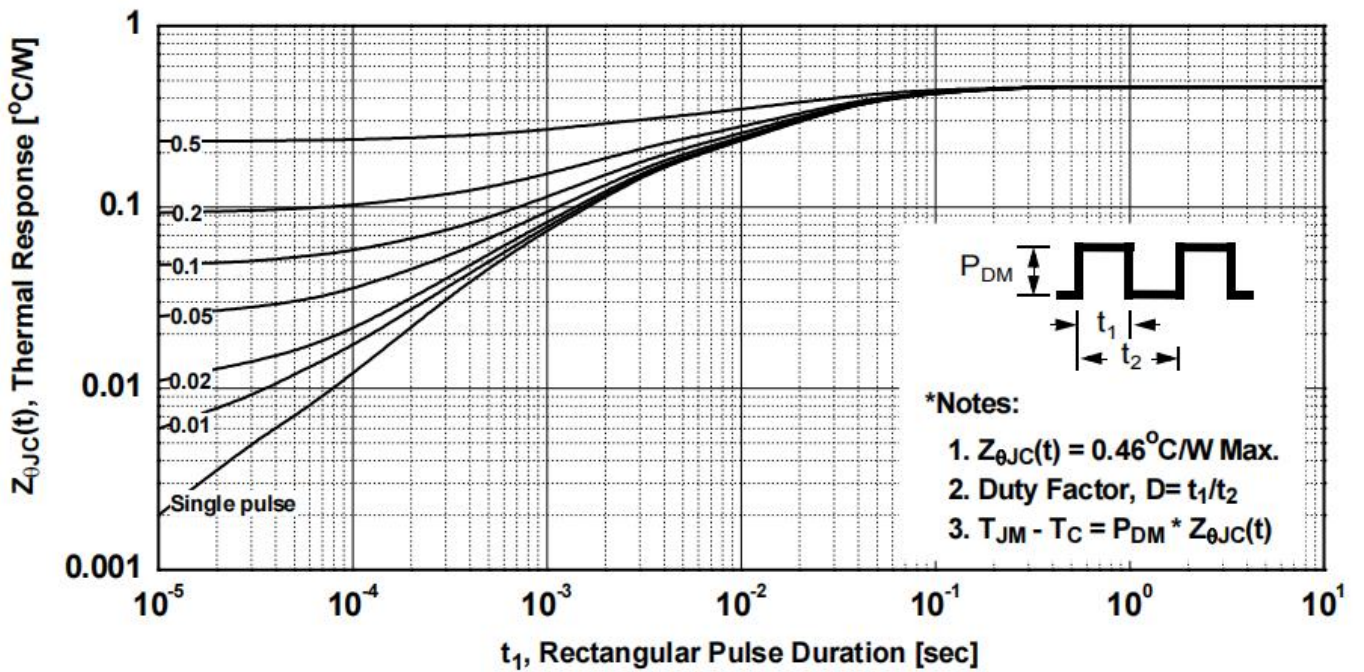
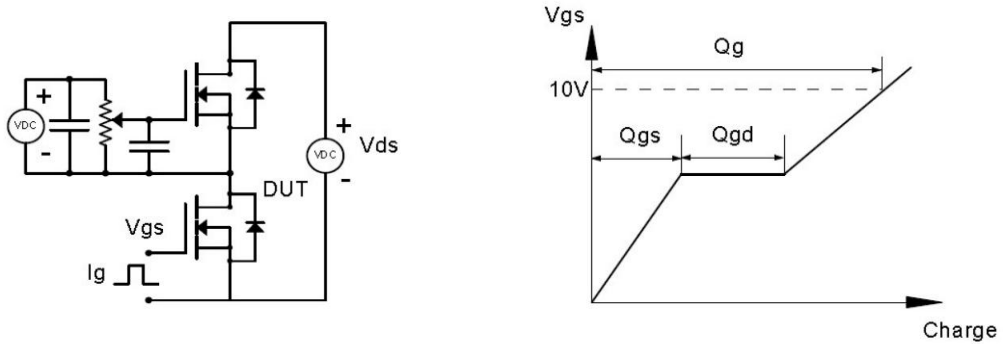


Fig 12: Max. Transient Thermal Impedance

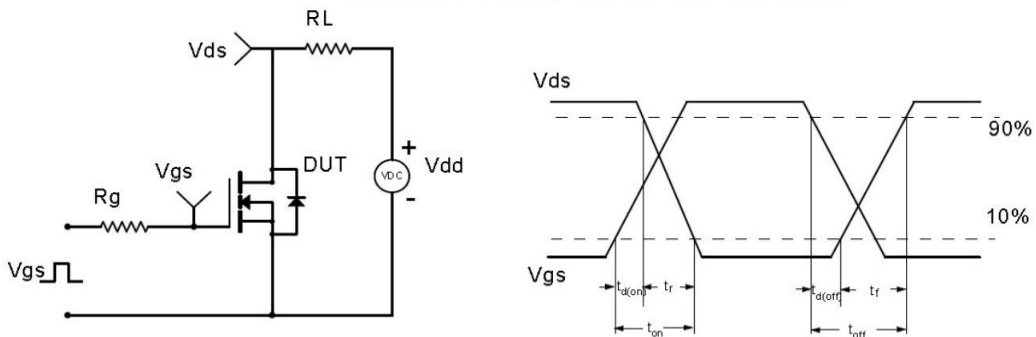


## Test Circuit & Waveform

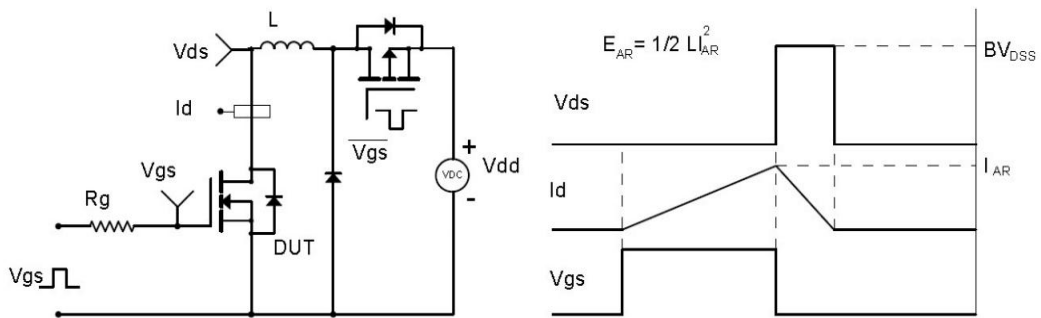
Gate Charge Test Circuit & Waveform



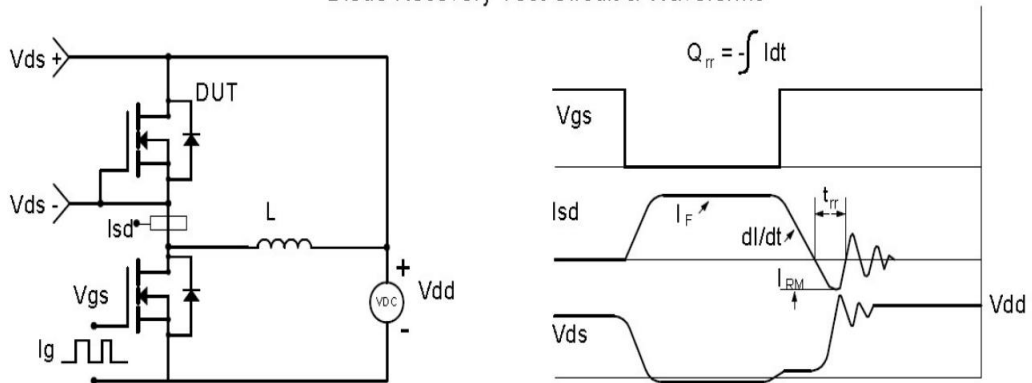
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



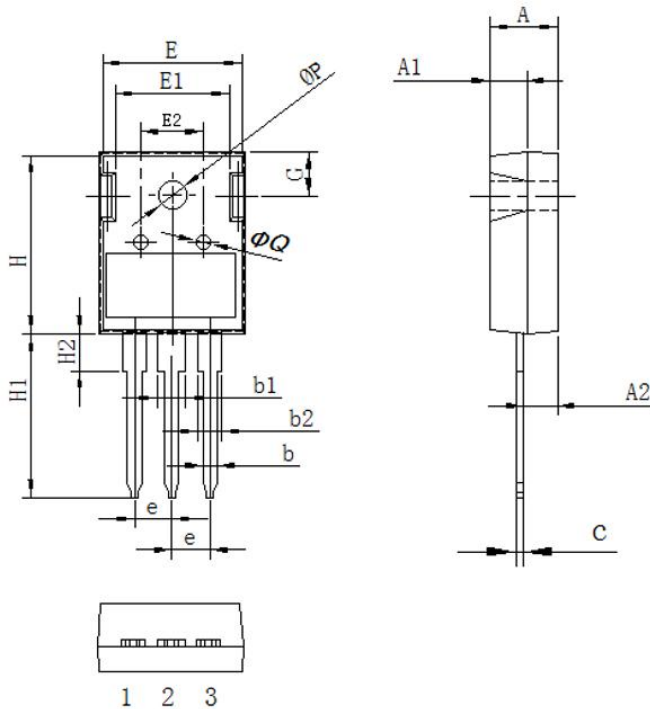
Diode Recovery Test Circuit & Waveforms



## Package Information

### TO-247H PACKAGE

#### 基本尺寸



Symbol	单位 mm		
	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.80	3.00	3.20
A2	2.20	2.40	2.60
b	1.05	1.20	1.35
b1	2.80	3.00	3.20
b2	1.80	2.00	2.20
c	0.50	0.60	0.70
e	5.35	5.45	5.75
E	15.6	15.80	16.0
E1	12.3	12.50	12.7
E2	6.00	6.20	6.40
H	20.5	21.0	21.5
H1	19.0	20.0	21.0
H2	3.00	4.00	5.00
G	5.70	5.90	6.10
ΦP	3.30	3.50	3.50
ΦQ	2.30	2.50	2.70

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