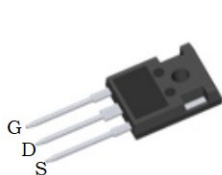




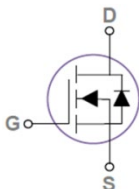
N-channel Power MOSFET

PRODUCT SUMMARY

I_D	120A
V_{DSS}	600V
$R_{DS(ON)-max}$ (@ $V_{GS}=10V$)	20m Ω
Q_g -typ. (nC)	208 nC
Configuration	single



TO-247



Schematic diagram

Features

- Low Gate Charge
- Low ON Resistance
- Intrinsic Fast-Recovery Body Diode
- Fast switching capability
- 100% Avalanche Tested
- RoHS compliant

Applications

- EV Charger
- Server/Telecom/PC Power
- AC-DC Power Management
- Solar Inverter

ORDERING INFORMATION

Item	Sales Type	Marking	Package	Packaging
1	PDI A 60R020JF2	PDI60R020JF2	TO-247	Tube

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Limit	Unit
		TO-247	
Drain to Source Voltage	V_{DSS}	600	V
Continuous Drain Current ⁽¹⁾ (@ $T_C=25^\circ\text{C}$)	I_D	120	A
Continuous Drain Current ⁽¹⁾ (@ $T_C=100^\circ\text{C}$)		72	A
Drain current pulsed ⁽²⁾ (@ $T_C=25^\circ\text{C}$)	I_{DM}	360	A
Gate to Source Voltage	V_{GS}	± 30	V
Single pulsed Avalanche Energy ⁽³⁾	E_{AS}	1960	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\ldots 480\text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\ldots 480\text{ V}$, $I_{SD}\leq I_D$	dv/dt	50	V/ns
Total power dissipation (@ $T_C=25^\circ\text{C}$)	P_D	347	W
Operating Junction Temperature & Storage Temperature	T_{STG}, T_J	-55 to + 150	$^\circ\text{C}$
Maximum lead temperature for soldering purpose	T_L	260	$^\circ\text{C}$

Notes

1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. L =20mH, $I_{AS} = 14A$, $V_{DD} = 50V$, $R_G=25\Omega$, Starting at $T_J = 25^\circ\text{C}$



THERMAL CHARACTERISTICS

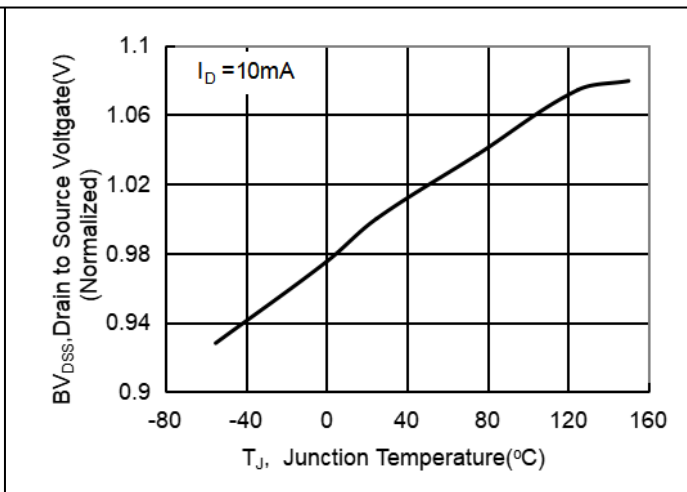
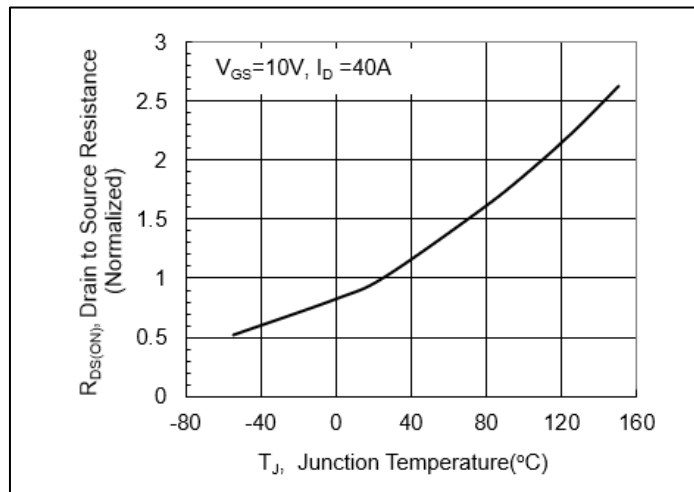
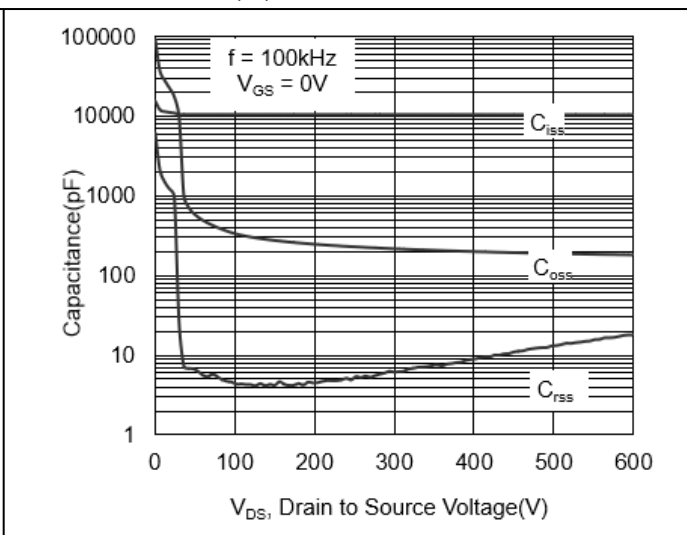
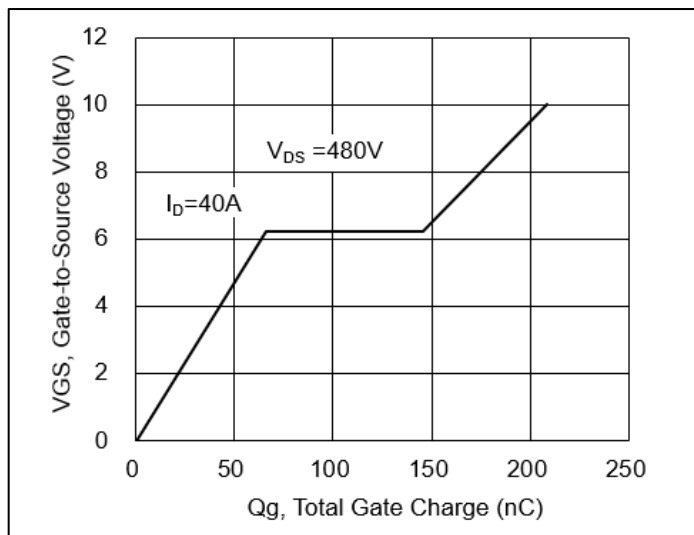
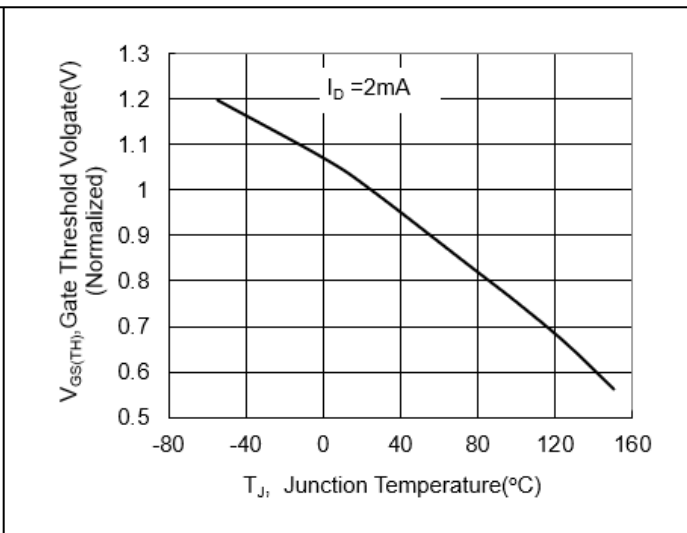
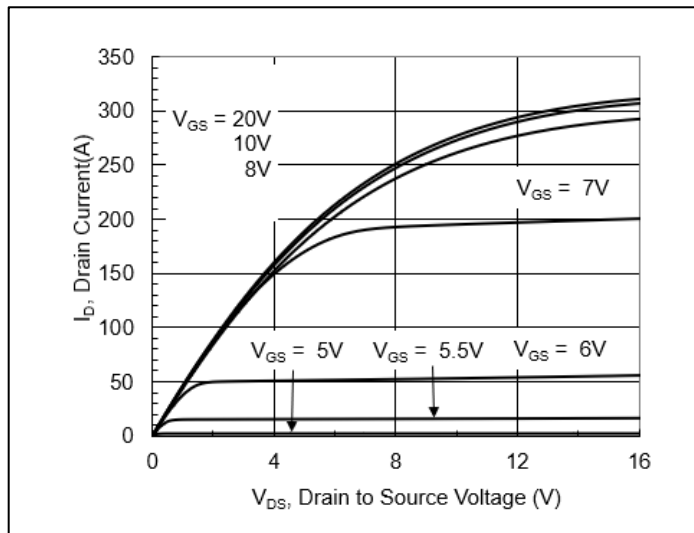
Parameter	Symbol	Value	Unit
		TO-247	
Thermal resistance, Junction to case (Maximum)	R_{thjc}	0.36	°C/W
Thermal resistance, Junction to ambient (Maximum)	R_{thja}	70	°C/W

ELECTRICAL CHARACTERISTICS ($T_C = 25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain to source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =2mA	600	--	--	V
Drain to source leakage current	I _{DSS}	V _{DS} =600V, V _{GS} =0V	--	--	10	uA
Gate to source leakage current, forward	I _{GSS}	V _{GS} =30V, V _{DS} =0V	--	--	100	nA
Gate to source leakage current, reverse		V _{GS} =-30V, V _{DS} =0V	--	--	-100	nA
On Characteristics						
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =2mA	3	4	5	V
Drain to source on state resistance	R _{DS(ON)}	V _{GS} =10V, I _D =40A	--	18	20	mΩ
		V _{GS} =10V, I _D =40A, T _j =150 °C	--	48	--	mΩ
Forward Transconductance	G _{fs}	V _{DS} =10V, I _D =50A	--	63	--	S
Dynamic Characteristics						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =50V, f=100KHz	--	10612	--	pF
Output capacitance	C _{oss}		--	566	--	
Reverse transfer capacitance	C _{rss}		--	6.5	--	
Effective output capacitance, energy related	C _{O(er)}	V _{GS} =0V, V _{DS} =0...400V		371		pF
Effective output capacitance, time related	C _{O(tr)}			2595		
Turn on delay time	t _{d(on)}	V _{DS} =400V, I _D =40A, R _G =2Ω, V _{GS} =10V	--	40	--	ns
Rising time	t _r		--	35	--	
Turn off delay time	t _{d(off)}		--	118	--	
Fall time	t _f		--	7	--	
Total gate charge	Q _g	V _{DS} =480V, V _{GS} =10V, I _D =40A	--	208	--	nC
Gate-source charge	Q _{gs}		--	65.7	--	
Gate-drain charge	Q _{gd}		--	79.5	--	
Gate Plateau Voltage	V _{plateau}		--	6.2	--	V
Gate Resistance	R _g	f=1MHz	--	2	--	Ω

SOURCE TO DRAIN DIODE RATINGS CHARACTERISTICS

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous source current	I_S	Integral reverse p-n Junction diode in the MOSFET	--	--	120	A
Pulsed source current	I_{SM}		--	--	360	A
Diode forward voltage drop.	V_{SD}	$I_S=40A, V_{GS}=0V$	--	0.88	1.2	V
Reverse recovery time	T_{rr}	$I_S=40A, V_{GS}=0V, V_R=300V$ $di_F/dt=100A/us$	--	210	--	ns
Reverse recovery Charge	Q_{rr}		--	2	--	uC
Peak Reverse Recovery Current	I_{rrm}		--	17	--	A



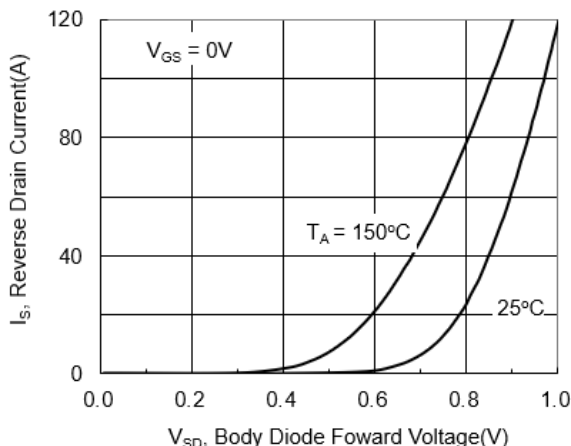


Fig 7 . Forward characteristics of reverse diode

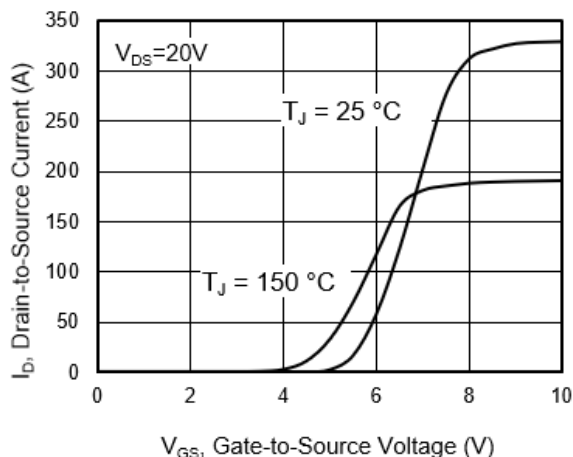


Fig 8 . Transfer characteristics

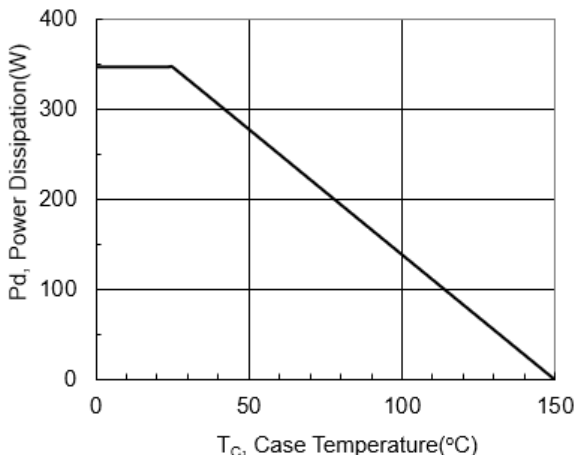


Fig 9 . Power dissipation

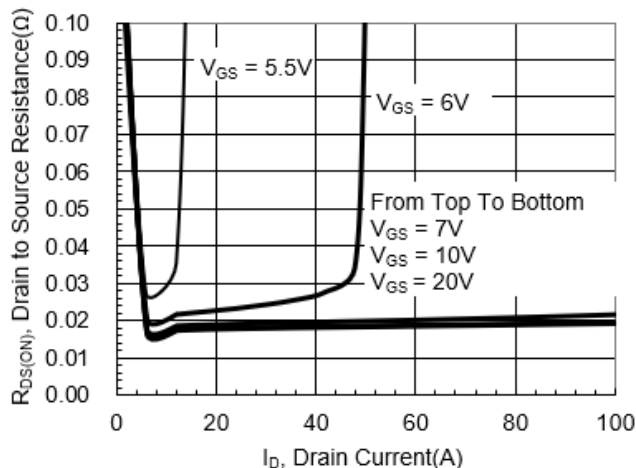


Fig 10. Drain-source on-state resistance $T_J = 25^\circ C$

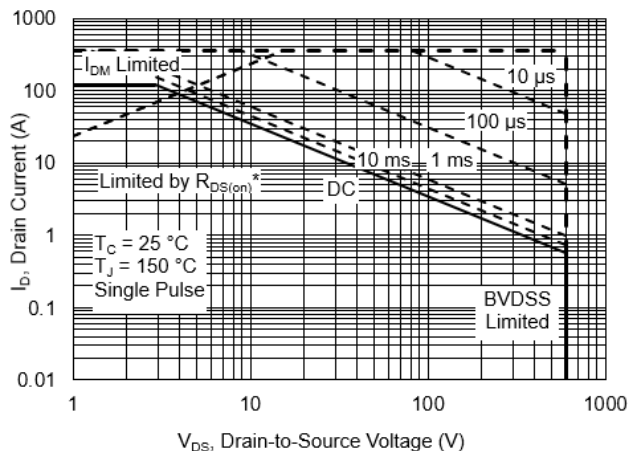


Fig 11. Safe operating area(TO-247)
 $T_C = 25^\circ C$

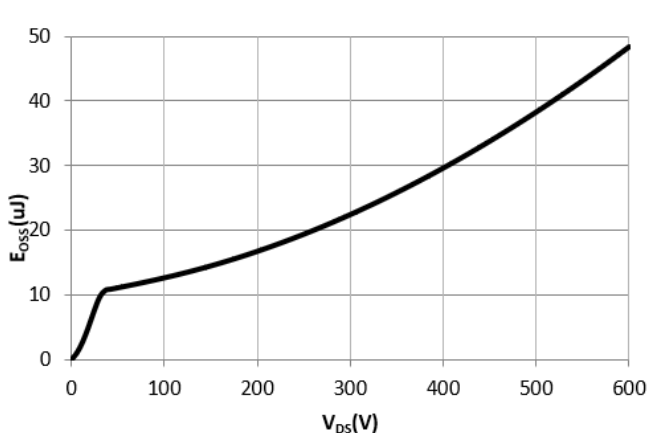


Fig 12 . E_{OSS} vs Drain-Source Voltage

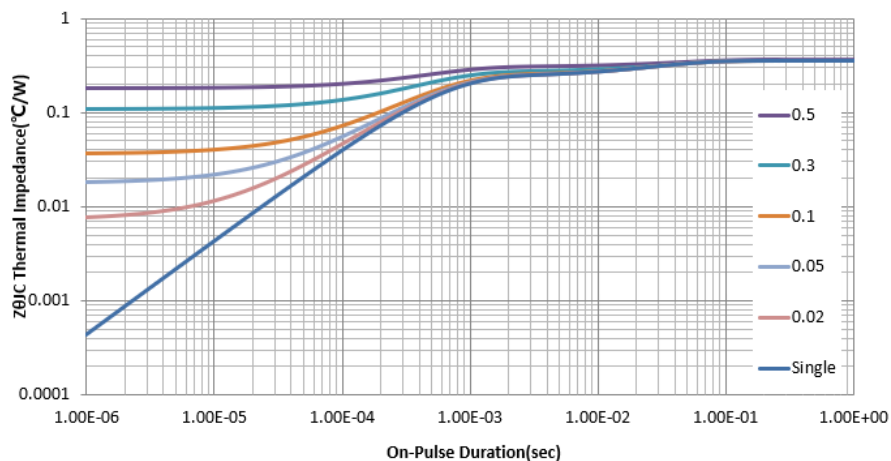


Fig 13. Transient thermal impedance

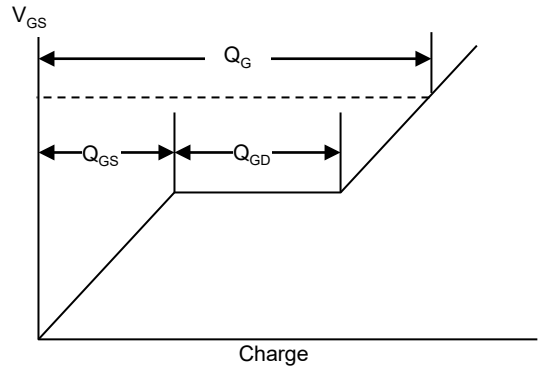
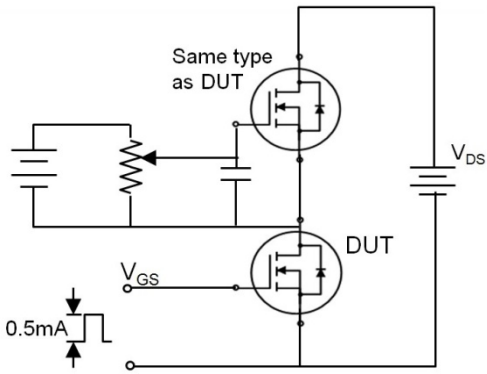


Fig 14. Gate charge test circuit & waveform

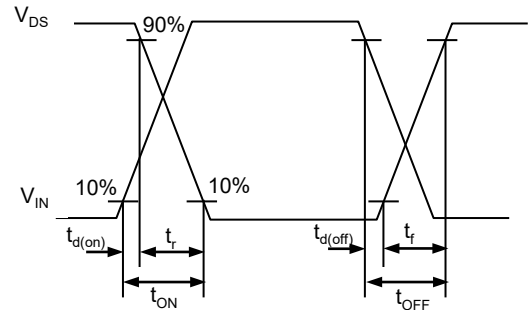
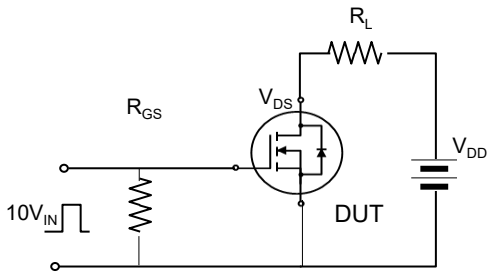


Fig 15. Switching time test circuit & waveform

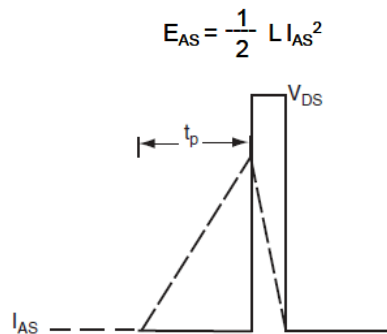
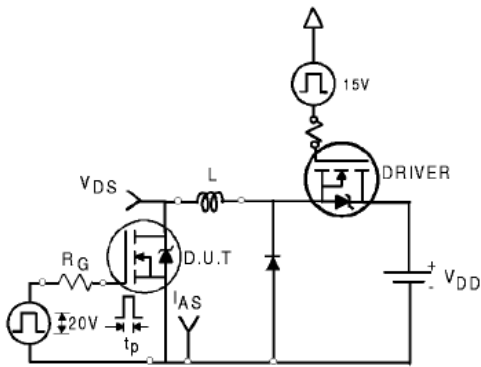


Fig 16. Unclamped Inductive switching test circuit & waveform

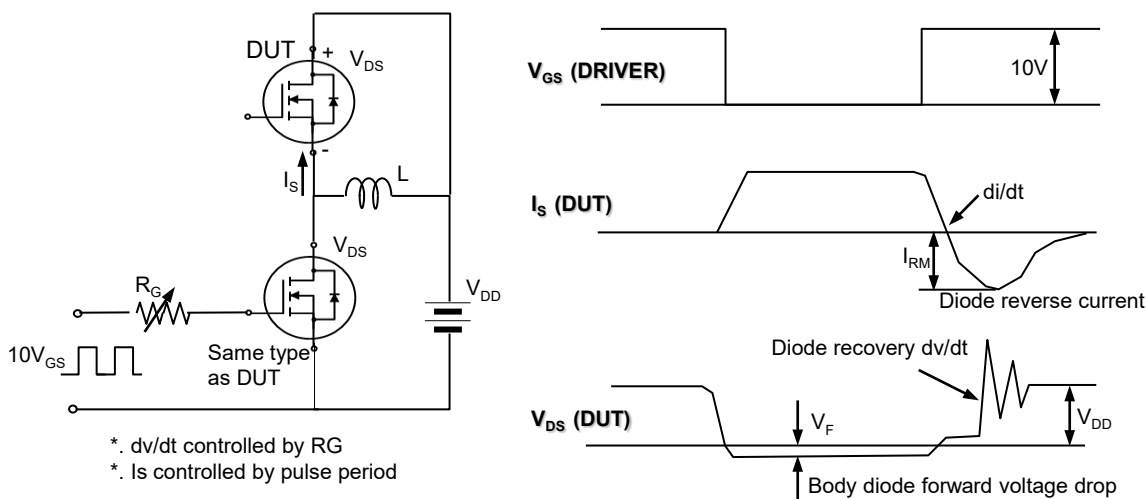
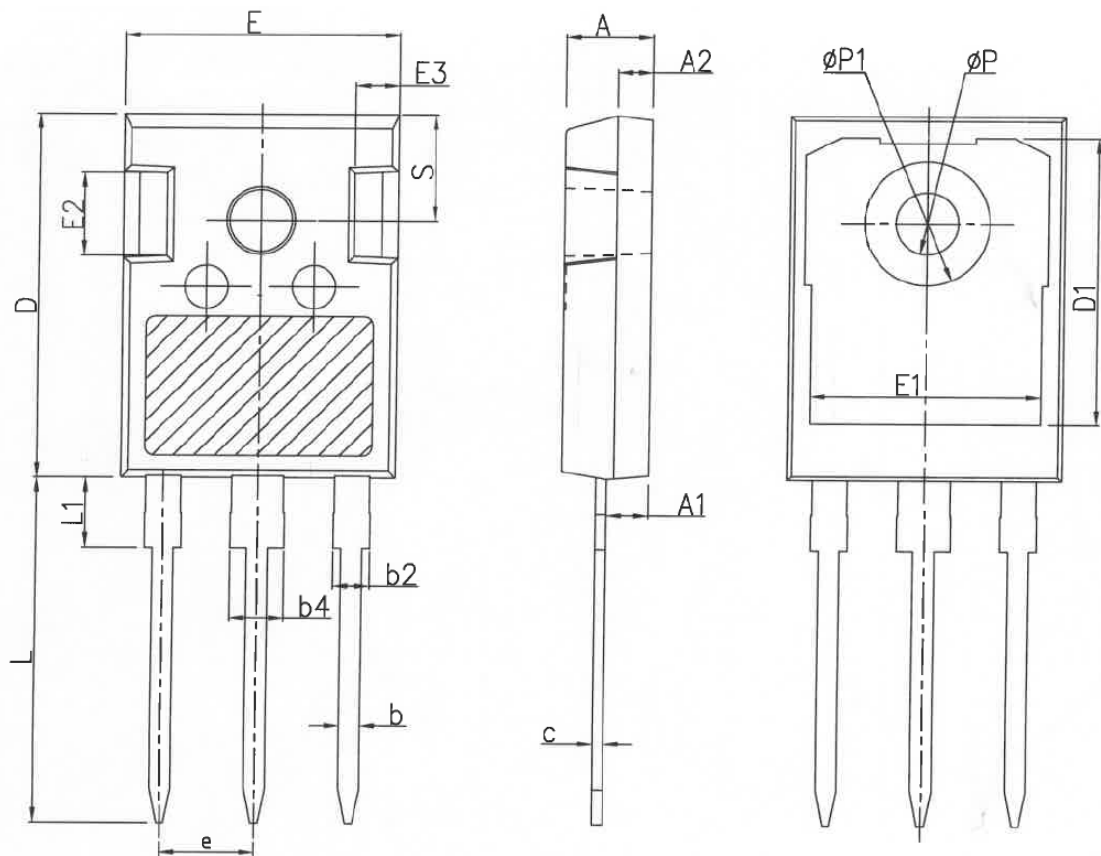


Fig 17. Peak diode recovery dv/dt test circuit & waveform



Package Outlines

TO-247



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
$\Phi P1$	-	-	7.30
S	6.15BSC		



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