



FEATURES

- ❑ Originative New Design
- ❑ 100% EAS Test
- ❑ Rugged Gate Oxide Technology
- ❑ Extremely Low Intrinsic Capacitances
- ❑ Remarkable Switching Characteristics
- ❑ Unequalled Gate Charge : 10 nC (Typ.)
- ❑ Extended Safe Operating Area
- ❑ Lower $R_{DS(ON)}$: 2.3 Ω (Typ.) @ $V_{GS}=10V$
- ❑ Halogen Free

APPLICATION

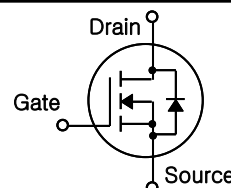
- ❑ Low power battery chargers
- ❑ Switch mode power supply (SMPS)
- ❑ DC-AC converters.

PFU4N70EG/PFD4N70EG 700V N-Channel MOSFET

$$BV_{DSS} = 700 V$$

$$R_{DS(on)} = 2.3 \Omega$$

$$I_D = 2.85 A$$

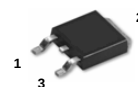


I-PAK(TO-251)



1.Gate 2. Drain 3. Source

D-PAK(TO-252)



1.Gate 2. Drain 3. Source

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	700	V
I_D	Drain Current – Continuous ($T_C = 25^\circ\text{C}$)	2.85	A
	Drain Current – Continuous ($T_C = 100^\circ\text{C}$)	1.8	A
I_{DM}	Drain Current – Pulsed (Note 1)	11.4	A
V_{GS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	210	mJ
I_{AR}	Avalanche Current (Note 1)	2.85	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	5.0	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
P_D	Total Power Dissipation ($T_A=25^\circ\text{C}$) *	2.5	W
	Power Dissipation ($T_C = 25^\circ\text{C}$)	50	W
	- Derate above 25°C	0.4	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	2.5	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-Ambient*	--	50	
$R_{\theta JA}$	Junction-to-Ambient	--	110	

* When mounted on the minimum pad size recommended (PCB Mount)

Electrical Characteristics $T_C=25\text{ }^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
V_{GS}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5	--	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 2.0\text{ A}$	--	2.3	2.8	Ω

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	700	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to $25\text{ }^{\circ}\text{C}$	--	0.6	--	$\text{V}/^{\circ}\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 700\text{ V}, V_{GS} = 0\text{ V}$	--	--	10	μA
		$V_{DS} = 560\text{ V}, T_C = 125\text{ }^{\circ}\text{C}$	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	585	760	pF
C_{oss}	Output Capacitance		--	63	82	pF
C_{rss}	Reverse Transfer Capacitance		--	4	6	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Time	$V_{DS} = 350\text{ V}, I_D = 4.0\text{ A},$ $R_G = 25\text{ }\Omega$ (Note 4,5)	--	14	28	ns
t_r	Turn-On Rise Time		--	7.5	15	ns
$t_{d(off)}$	Turn-Off Delay Time		--	28	56	ns
t_f	Turn-Off Fall Time		--	6.5	13	ns
Q_g	Total Gate Charge	$V_{DS} = 560\text{ V}, I_D = 4.0\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 4,5)	--	10	15	nC
Q_{gs}	Gate-Source Charge		--	3.2	--	nC
Q_{gd}	Gate-Drain Charge		--	3.8	--	nC

Source-Drain Diode Maximum Ratings and Characteristics

I _S	Continuous Source-Drain Diode Forward Current		--	--	2.85	A
I _{SM}	Pulsed Source-Drain Diode Forward Current		--	--	11.4	
V _{SD}	Source-Drain Diode Forward Voltage	I _S = 4.0 A, V _{GS} = 0 V	--	--	1.5	V
t _{rr}	Reverse Recovery Time	I _S = 4.0 A, V _{GS} = 0 V di _F /dt = 100 A/μs (Note 4)	--	290	--	ns
Q _{rr}	Reverse Recovery Charge		--	1.8	--	μC

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS}=4.0\text{ A}, V_{DD}=50\text{ V}, R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$
3. $I_{SD}\leq 4.0\text{ A}, di/dt\leq 300\text{ A}/\mu\text{s}, V_{DD}\leq BV_{DSS}$, Starting $T_J=25\text{ }^{\circ}\text{C}$
4. Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

Typical Characteristics

Fig 1. Output Characteristics

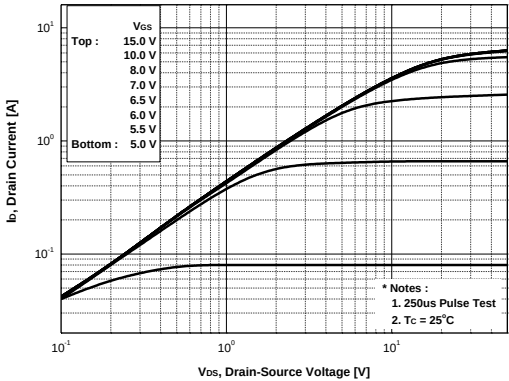


Fig 2. Transfer Characteristics

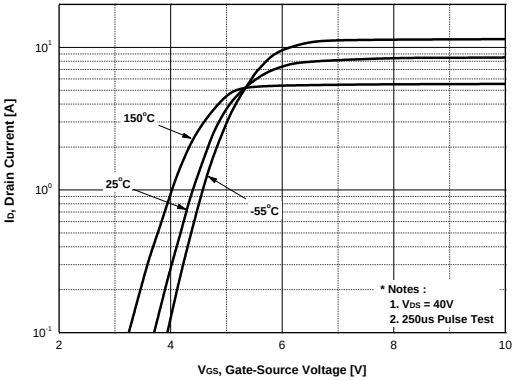


Fig 3. Static Drain-Source On Resistance

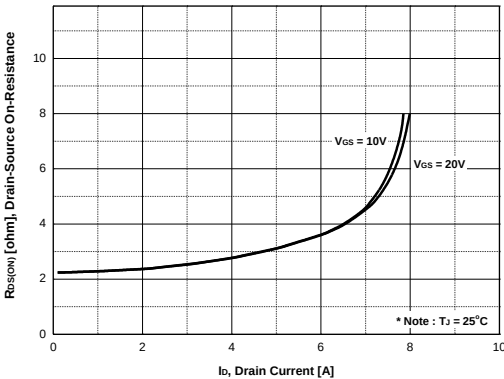


Fig 4. Source-Drain Diode Forward Voltage

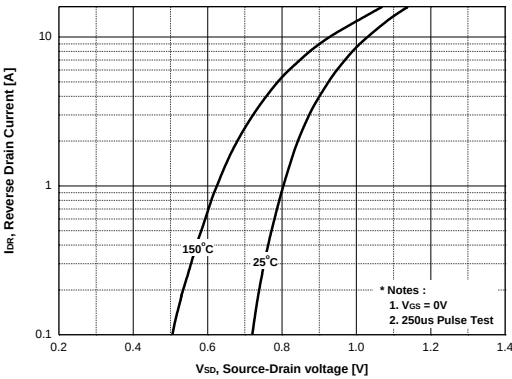


Fig 5. Capacitance Characteristics

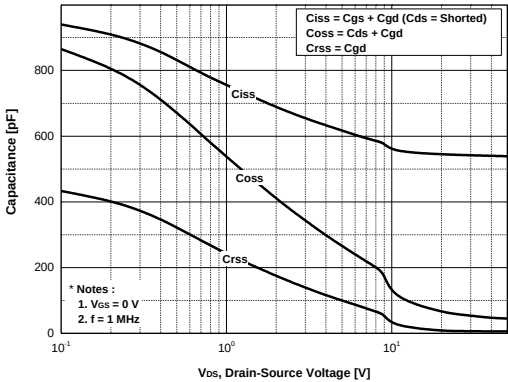
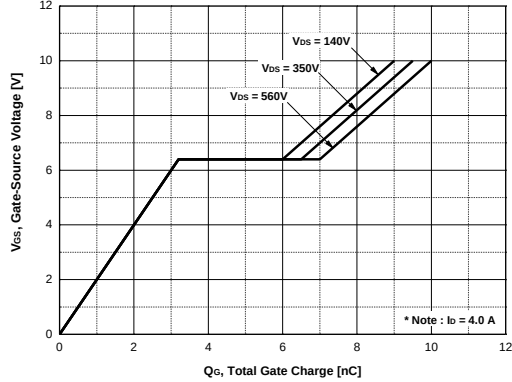


Fig 6. Gate Charge Characteristics



Typical Characteristics (continued)

Fig 7. BV_{DS} vs. Junction Temperature

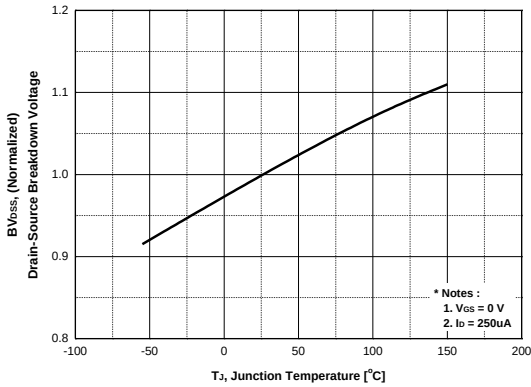


Fig 8. $R_{DS(ON)}$ vs. Junction Temperature

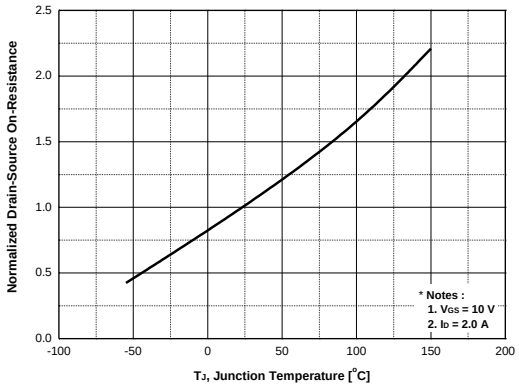


Fig 9. Safe Operation Area

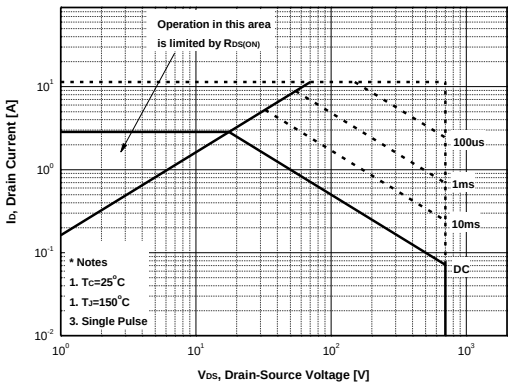


Fig 10. Maximum I_D vs. Case Temperature

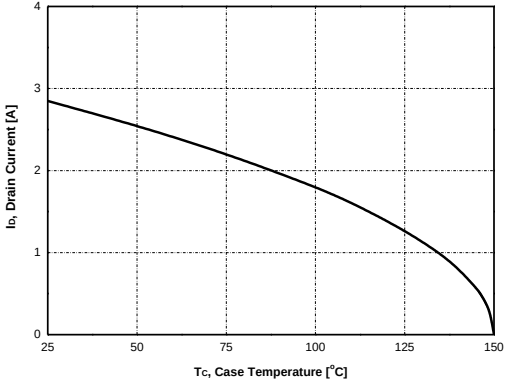
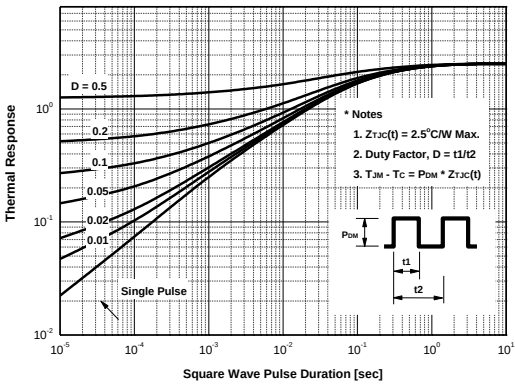


Fig 11. Transient Thermal Response Curve



Characteristics Test Circuit & Waveform

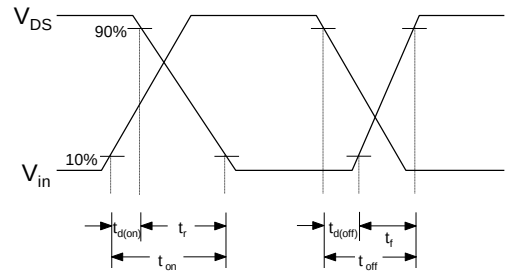
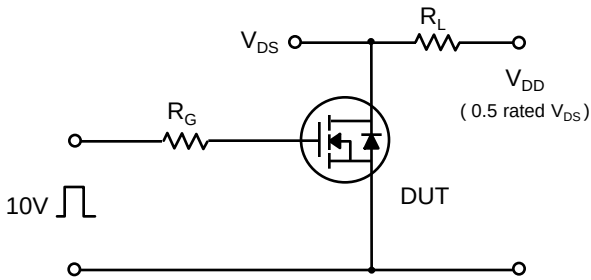


Fig 14. Resistive Switching Test Circuit & Waveforms

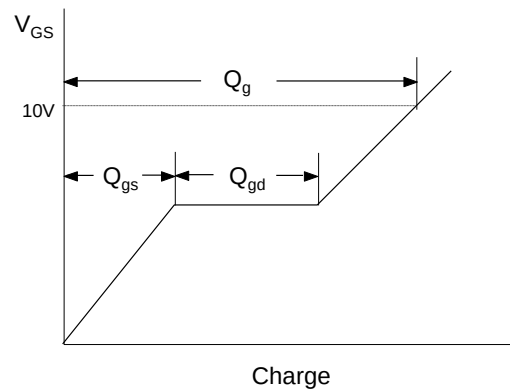
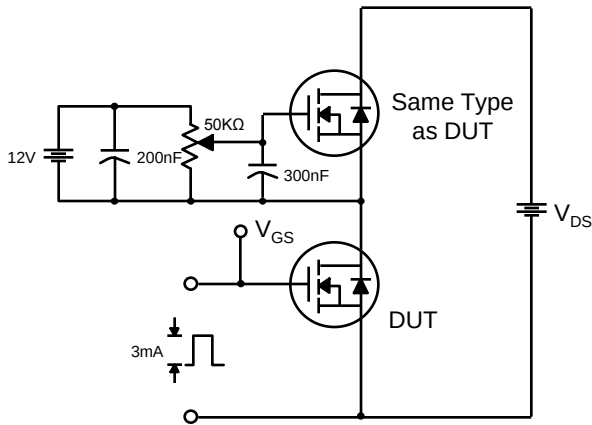


Fig 15. Gate Charge Test Circuit & Waveform

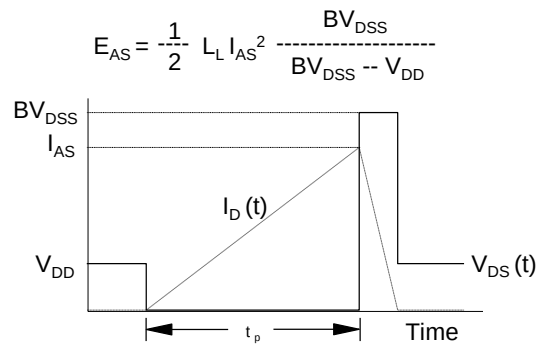
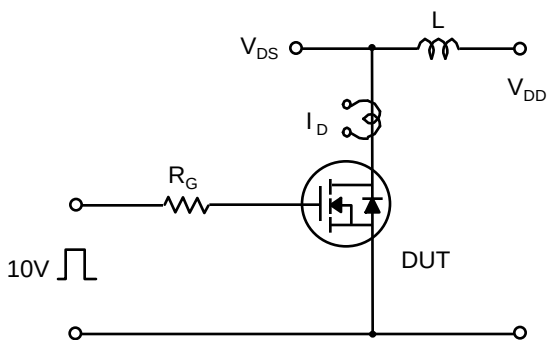


Fig 16. Unclamped Inductive Switching Test Circuit & Waveforms

Characteristics Test Circuit & Waveform (continued)

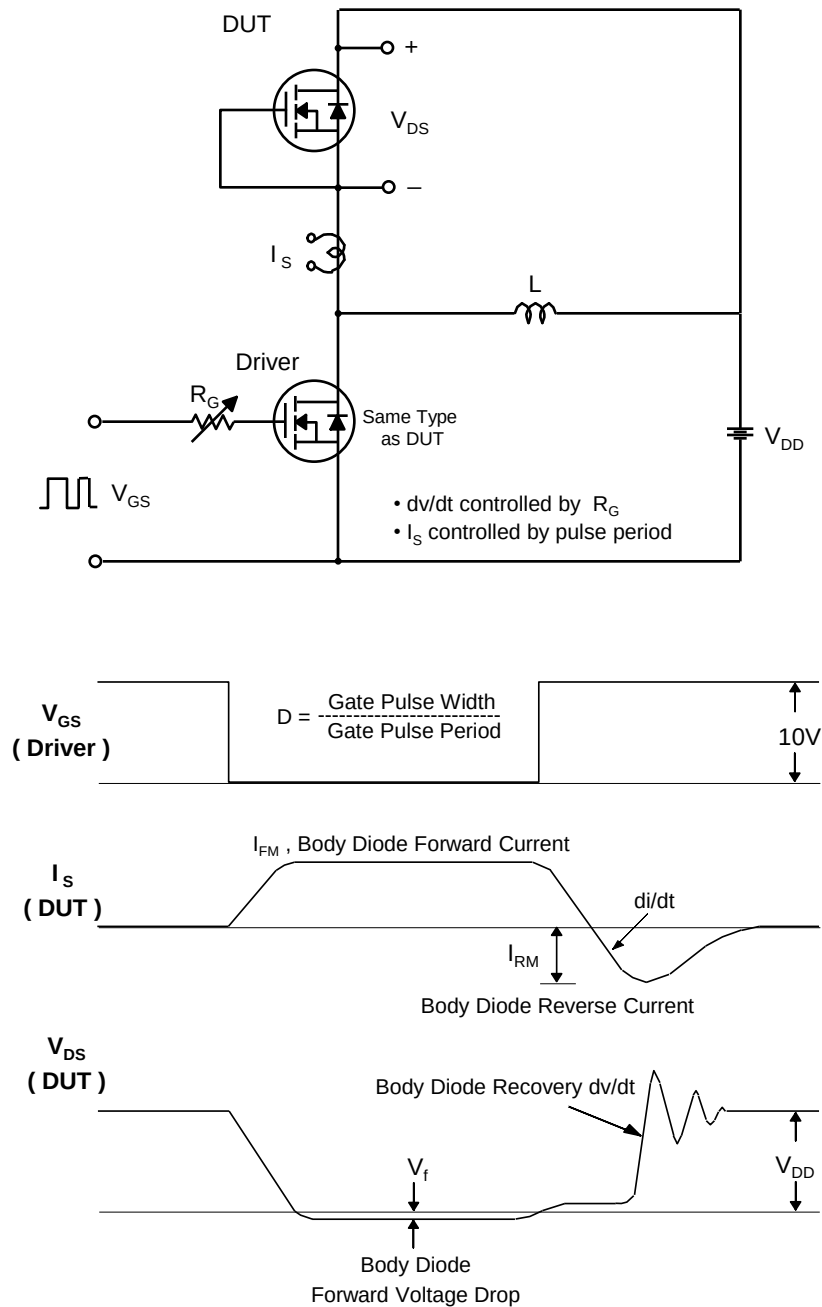
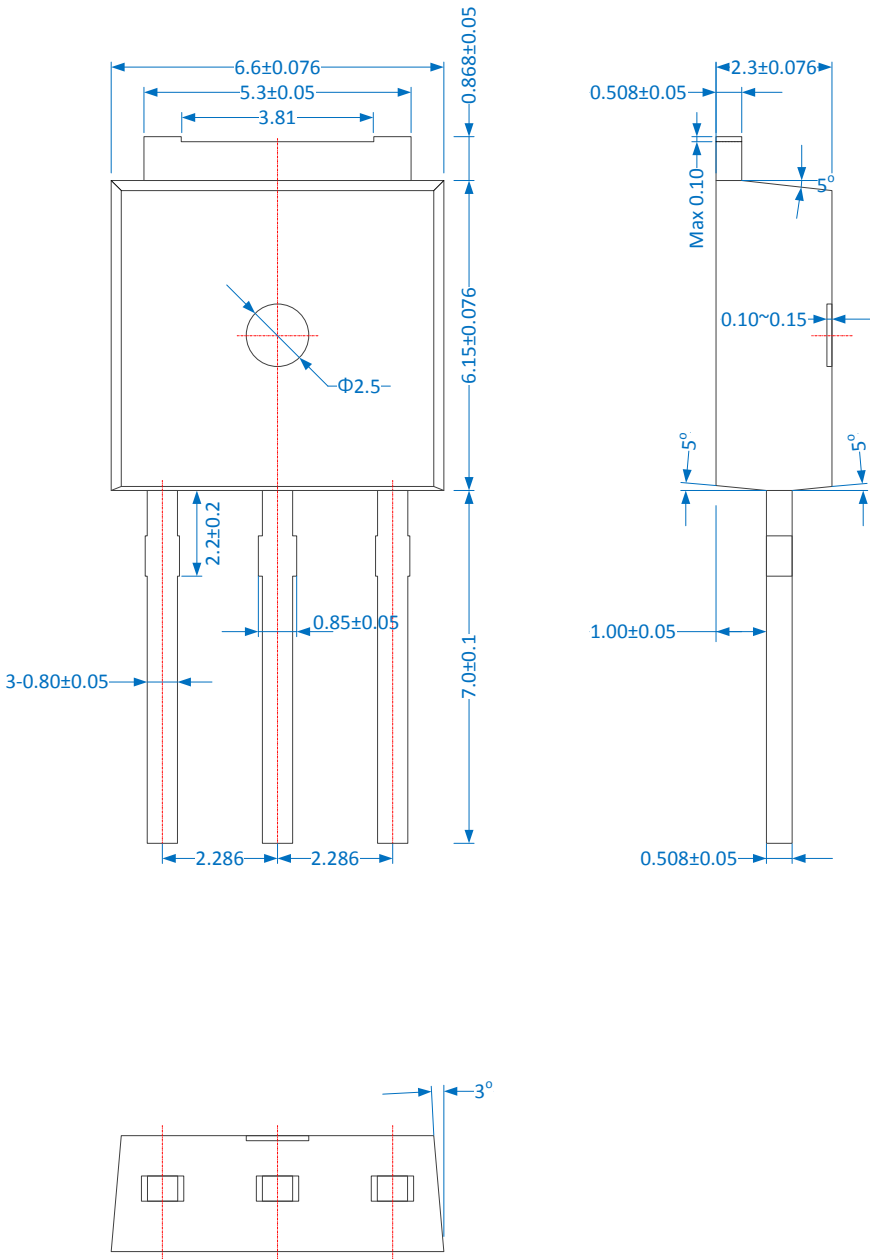


Fig 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Package Dimension

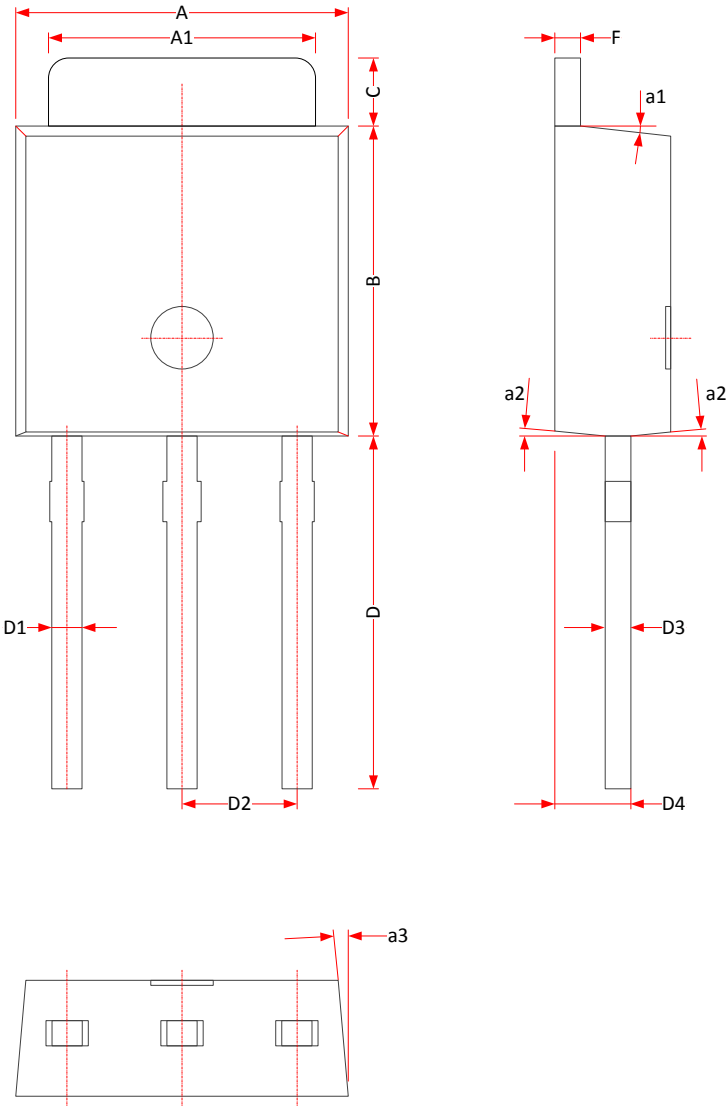
I-PAK(TO-251) ②



Package Dimension

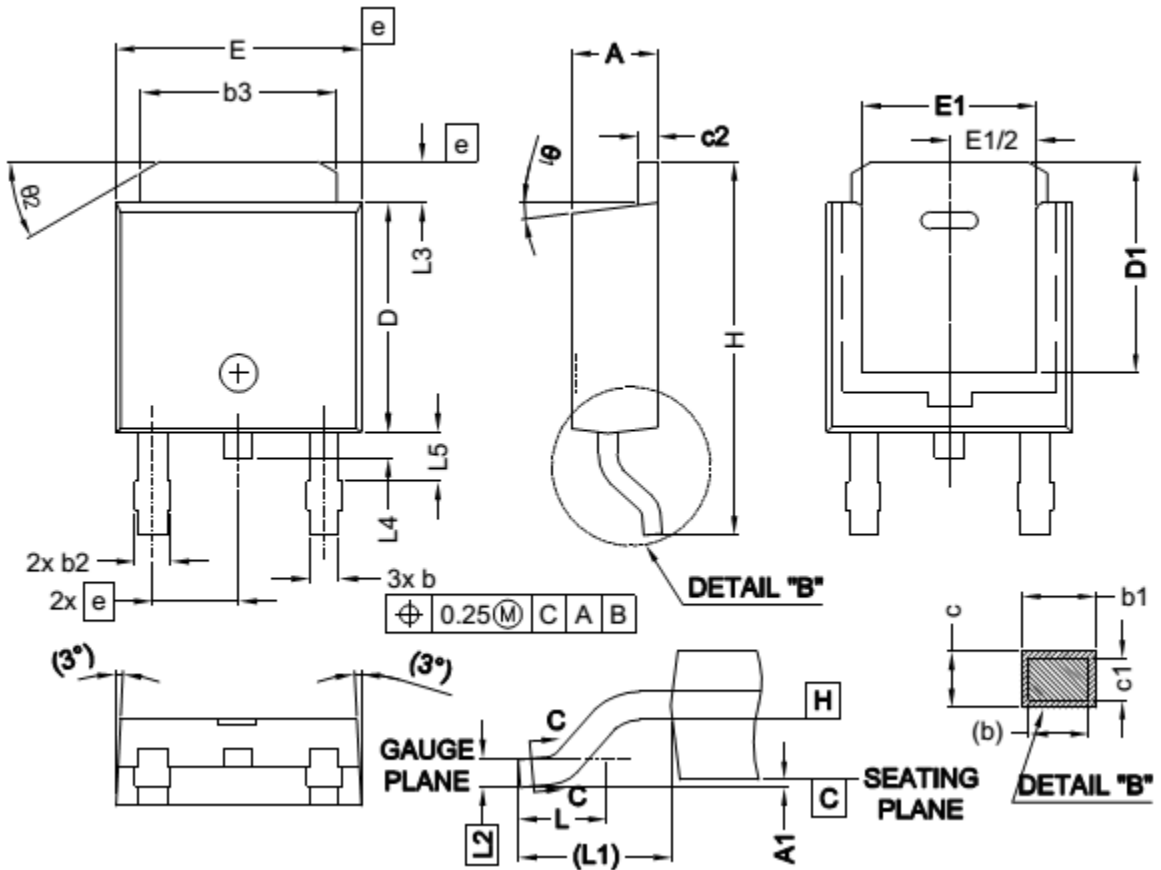
I-PAK(TO-251) ⑧

Symbol	Millimeters
A	6.40 ~ 6.60
A1	5.30 ~ 5.50
B	5.40 ~ 5.70
C	1.35 ~ 1.65
D	7.40 ~ 8.00
D1	0.60 ~ 0.75
D2	2.30
D3	0.49 ~ 0.59
D4	1.72 ~ 1.82
E	2.20 ~ 2.40
F	0.55 ~ 0.65
a1	5 deg
a2	5 deg
a3	2 deg



Package Dimension

D-PAK(TO-252) ①



SYMBOL	MIN.	MAX.	SYMBOL	MIN.	MAX.	SYMBOL	MIN.	MAX.
A	2.18	2.39	E	6.35	6.73	ϕ_1	0°	15°
A1	-	0.13	E1	4.32	-	ϕ_2	25°	35°
b	0.640	0.884	e	2.29 BSC				
b1	0.65	0.79	H	9.94	10.34			
b2	0.760	1.124	L	1.50	1.78			
b3	4.95	5.46	L1	2.74 REF				
c	0.46	0.61	L2	0.51 BSC				
c1	0.41	0.56	L3	0.89	1.27			
c2	0.40	0.60	L4	-	1.02			
D	5.97	6.22	L5	1.140	1.492			
D1	5.21	-	ϕ	0°	10°			

Package Dimension

D-PAK(TO-252) ②

