Green Package

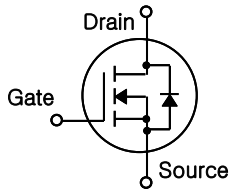
PFU3N70HG/PFD3N70HG

700V N-Channel MOSFET

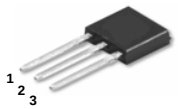
BV_{DSS} = 700 V

$R_{DS(on)}$ = 3.2 Ω

I_D = 2.4 A



I-PAK(TO-251)



1.Gate 2. Drain 3. Source

D-PAK(TO-252)

1.Gate 2. Drain 3. Source

FEATURES

- Originative New Design
- 100% EAS Test
- Rugged Gate Oxide Technology
- Extremely Low Intrinsic Capacitances
- Remarkable Switching Characteristics
- Unequalled Gate Charge : 6.8 nC (Typ.)
- Extended Safe Operating Area
- Lower $R_{DS(ON)}$: 3.2 Ω (Typ.) @V_{GS}=10V
- Halogen Free

APPLICATION

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

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter		Value	Units
V_{DSS}	Drain-Source Voltage		700	V
I_D	Drain Current – Continuous (T_C = 25℃)		2.4	A
	Drain Current – Continuous (T_C = 100℃)		1.5	A
I_{DM}	Drain Current – Pulsed	(Note 1)	9.5	A
V_{GS}	Gate-Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	62.5	mJ
I_{AR}	Avalanche Current	(Note 1)	3.4	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 °C) *		2.5	W
	Power Dissipation (T_C = 25℃)		50	W
	- Derate above 25℃		0.4	W/℃
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	℃

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	2.5	℃/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 °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 uA	2.0	--	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 1.5 A	--	3.2	4.0	Ω
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	700	--	--	V
ΔBV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 uA, Referenced to25℃	--	0.6	--	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 700 V, V_{GS} = 0 V	--	--	10	uA
		V_{DS} = 560 V, T_C = 125℃	--	--	100	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	410	530	pF
C_{oss}	Output Capacitance		--	50	65	pF
C_{rss}	Reverse Transfer Capacitance		--	5.2	6.8	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	V_{DS} = 350 V, I_D = 3.0 A, R_G = 25 Ω (Note 4,5)	--	13	26	ns
t_r	Turn-On Rise Time		--	23	45	ns
$t_{d(off)}$	Turn-Off Delay Time		--	7	14	ns
t_f	Turn-Off Fall Time		--	15	30	ns
Q_g	Total Gate Charge	V_{DS} = 560 V, I_D = 3.0 A, V_{GS} = 10 V (Note 4,5)	--	6.8	10	nC
Q_{gs}	Gate-Source Charge		--	2.3	--	nC
Q_{gd}	Gate-Drain Charge		--	2.2	--	nC
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	3.4	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	13.5	A
V_{SD}	Source-Drain Diode Forward Voltage	I_S = 3.0 A, V_{GS} = 0 V	--	--	1.5	V
trr	Reverse Recovery Time	I_S = 3.0 A, V_{GS} = 0 V, di_F/dt = 100 A/μs (Note 4)	--	320	--	ns
Qrr	Reverse Recovery Charge		--	1.8	--	μC

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. I_{AS}=3.4A, L=11mH, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
3. I_{SD}≤3.4A, di/dt≤300A/μs, V_{DD}≤BV_{DSS} , Starting T_J=25 °C
4. Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature

Typical Characteristics

Fig 1. Output Characteristics

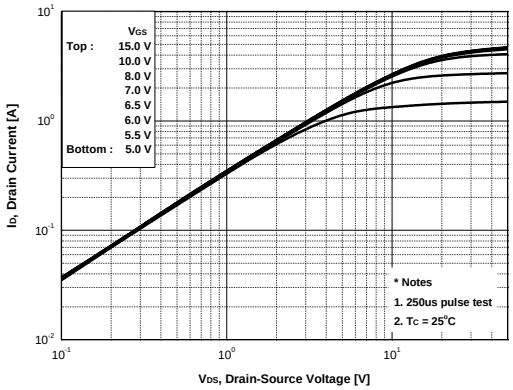


Fig 2. Transfer Characteristics

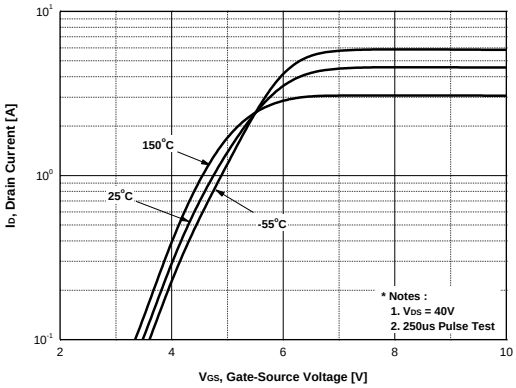


Fig 3. Static Drain-Source On Resistance

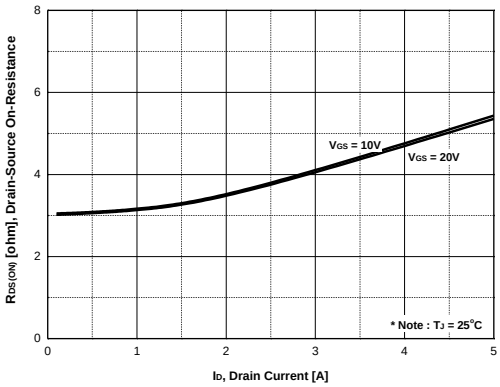


Fig 4. Source-Drain Diode Forward Voltage

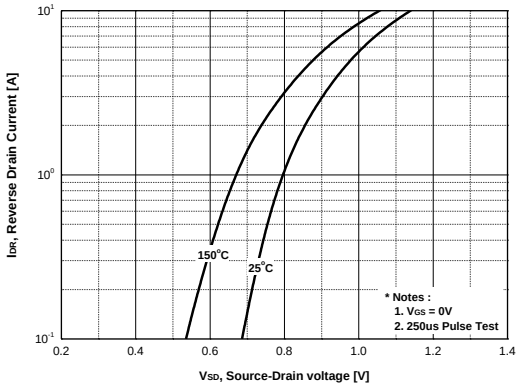


Fig 5. Capacitance Characteristics

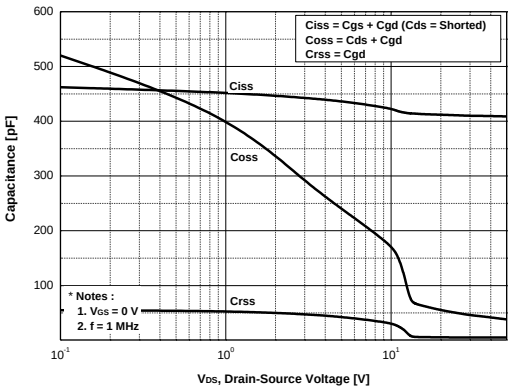
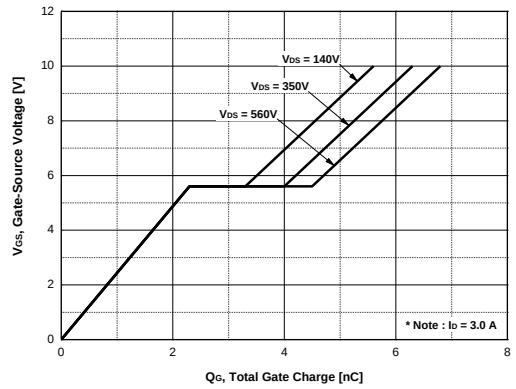


Fig 6. Gate Charge Characteristics



Typical Characteristics (continued)

Fig 7. BV_{DSS} vs. Junction Temperature

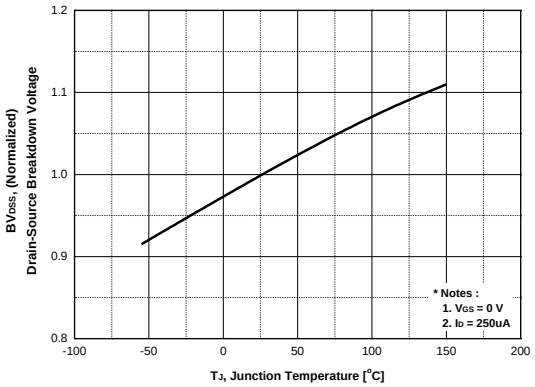


Fig 8. $R_{DS(ON)}$ vs. Junction Temperature

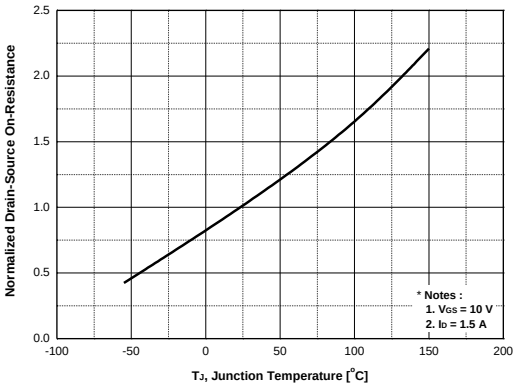


Fig 9. Safe Operation Area

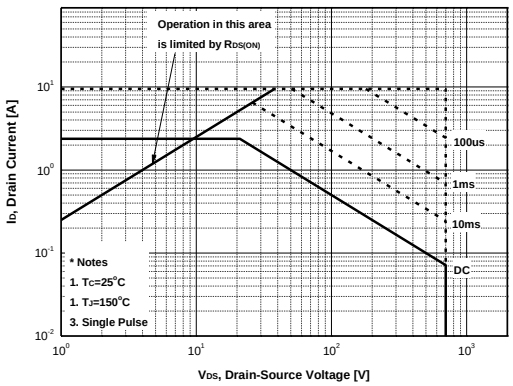


Fig 10. Maximum ID vs. Case Temperature

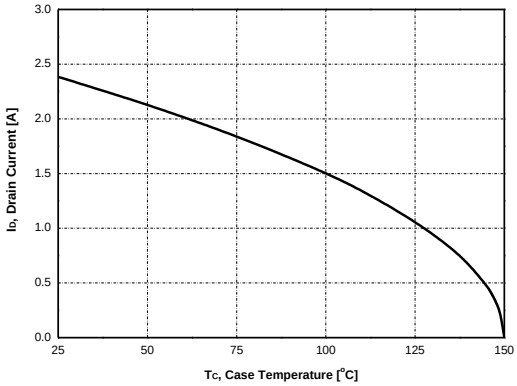
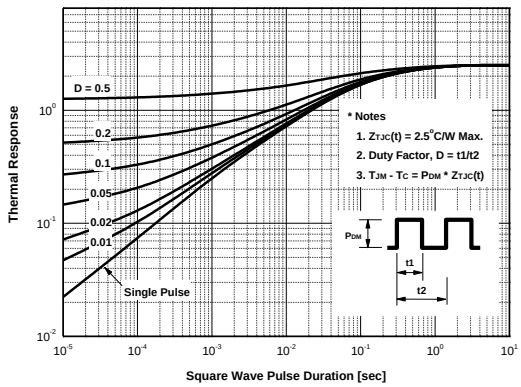


Fig 11. Transient Thermal Response Curve



Characteristics Test Circuit & Waveform

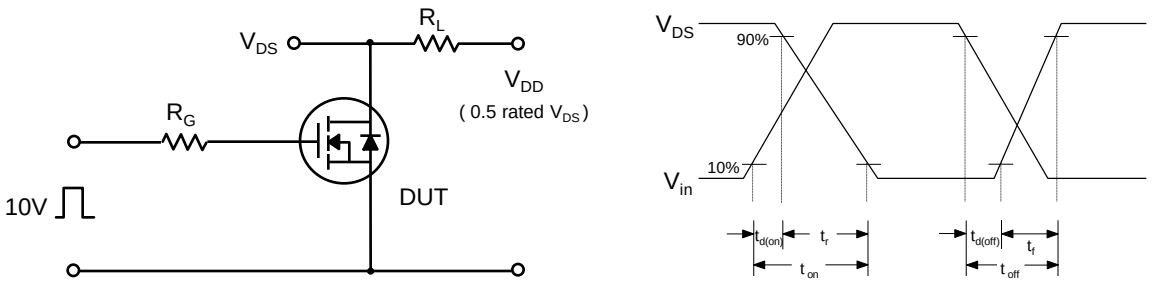


Fig 14. Resistive Switching Test Circuit & Waveforms

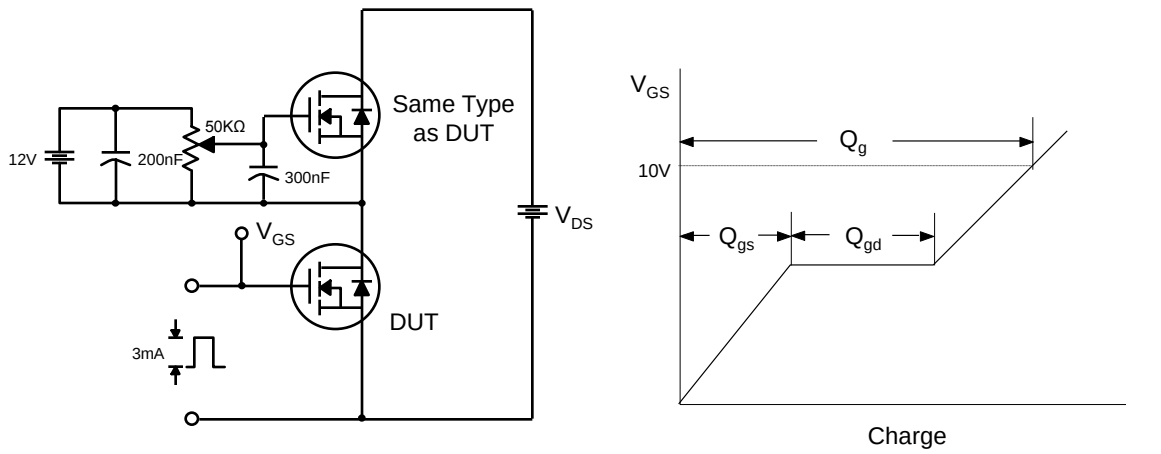


Fig 15. Gate Charge Test Circuit & Waveform

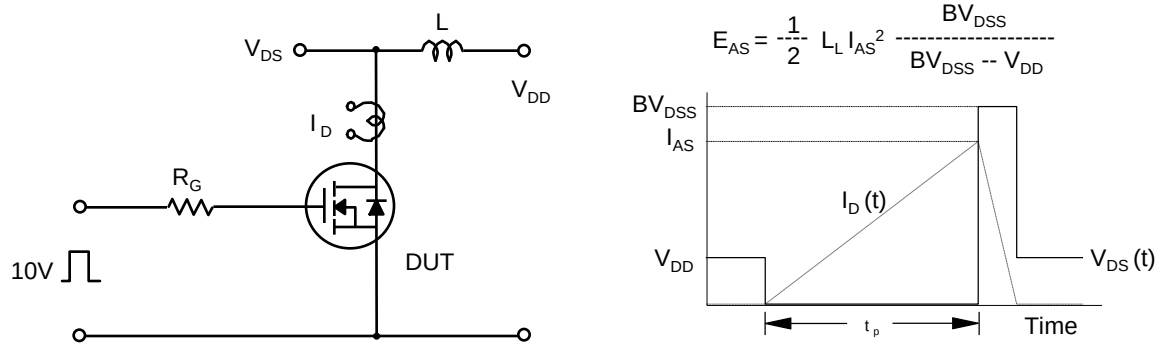
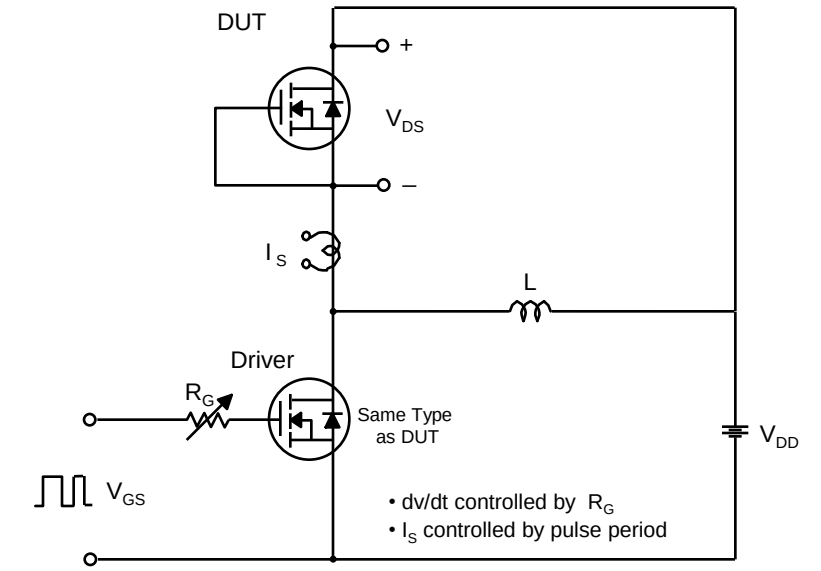


Fig 16. Unclamped Inductive Switching Test Circuit & Waveforms

Characteristics Test Circuit & Waveform (continued)



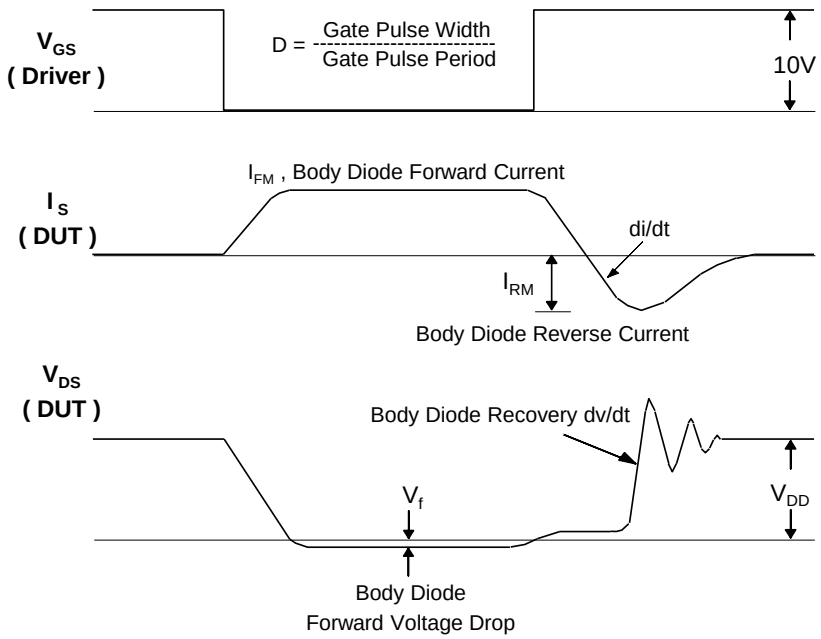
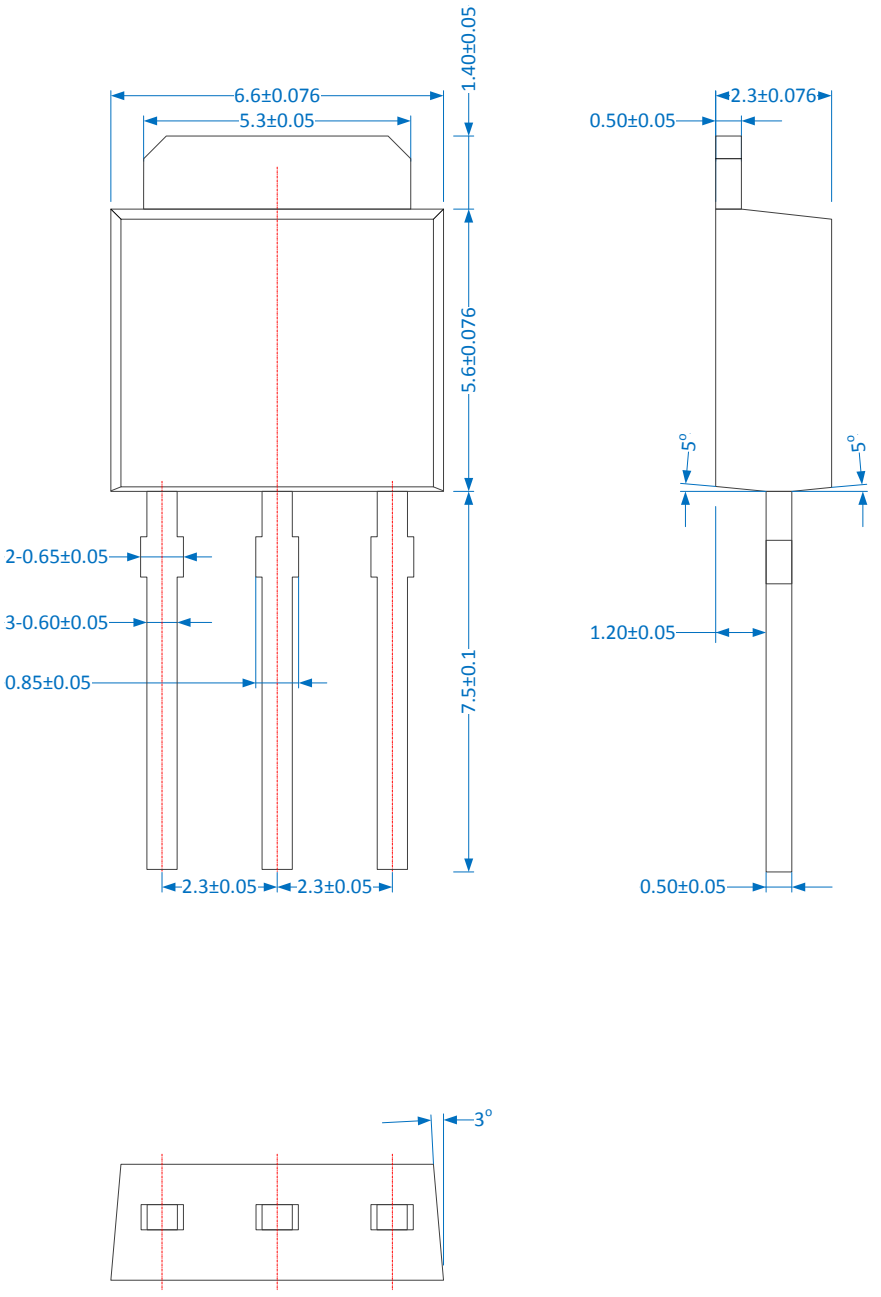


Fig 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Package Dimension

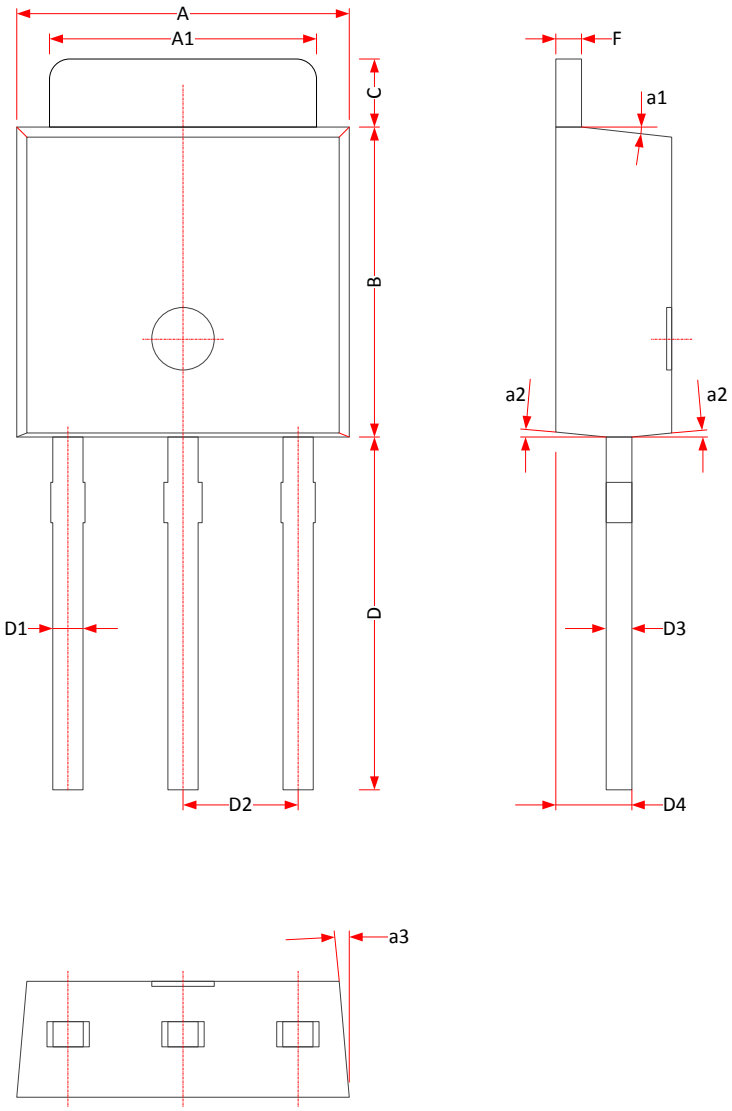
I-PAK(TO-251) ⓩ



Package Dimension

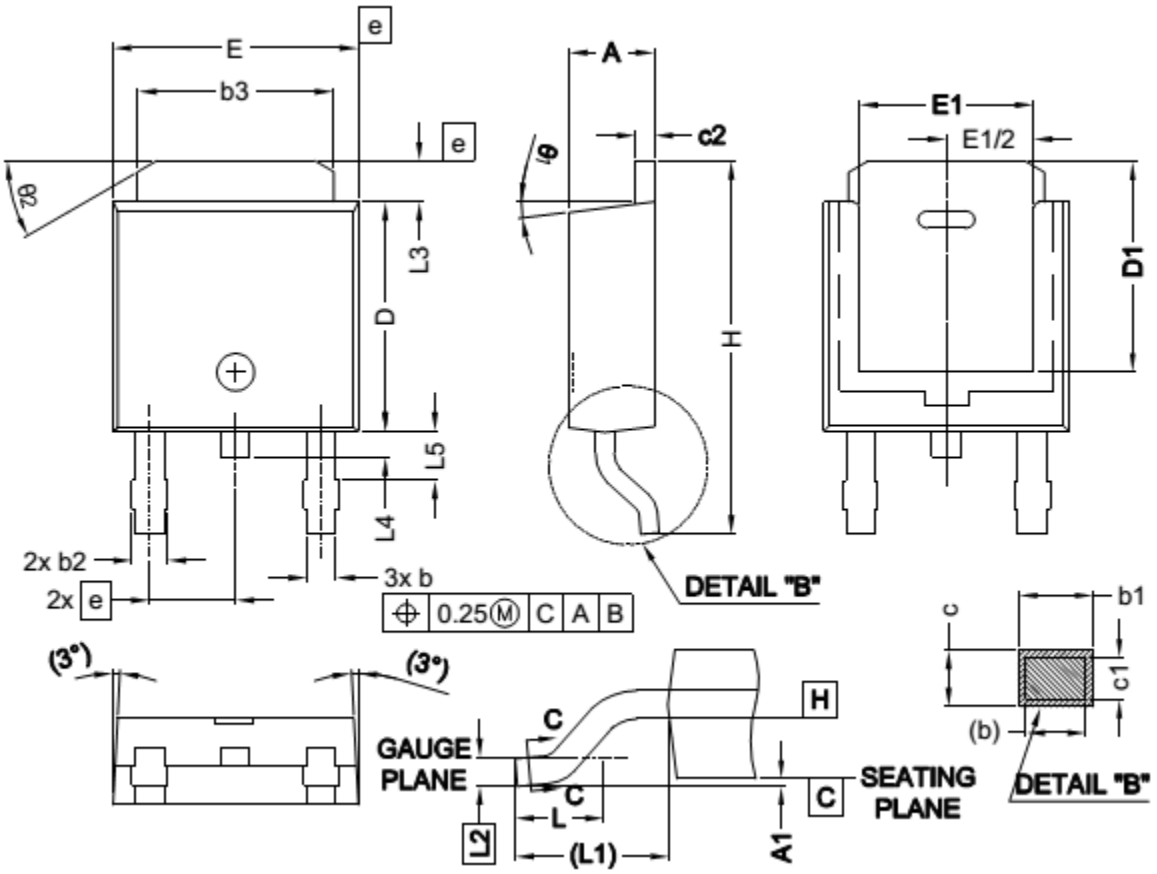
I-PAK(TO-251) ⓗ

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) ⓐ



SYMBOL	MIN.	MAX.	SYMBOL	MIN.	MAX.	SYMBOL	MIN.	MAX.
A	2.18	2.39	E	6.35	6.73	ϕ1	0°	15°
A1	-	0.13	E1	4.32	-	ϕ2	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) ⓩ