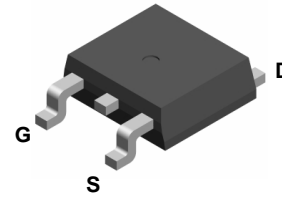




V _{DSS}	500	V
I _D	9	A
P _D (T _C =25°C)	130	W
R _{DS(ON)}	0.68	Ω

PIN Connection TO-252



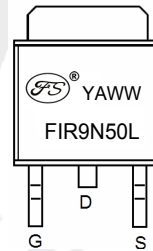
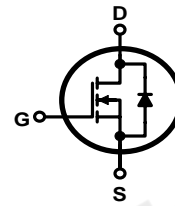
Features

- Fast Switching
- Low ON Resistance(R_{dson} 0.85Ω)
- Low Gate Charge (Typical Data:13nC)
- Low Reverse transfer capacitances(Typical:12pF)
- 100% Single Pulse avalanche energy Test

Applications

Power switch circuit of adaptor and charger.

Schematic diagram



Marking Diagram

- Y = Year
- A = Assembly Location
- WW = Work Week
- FIR9N50L = Specific Device Code

Absolute (T_c= 25°C unless otherwise specified)

Symbol	Parameter	Rating	Units
V _{DSS}	Drain-to-Source Voltage	500	V
I _D	Continuous Drain Current	9	A
	Continuous Drain Current T _C = 100 °C	5	A
I _{DM} ^{a1}	Pulsed Drain Current	32	A
V _{GS}	Gate-to-Source Voltage	± 30	V
E _{AS} ^{a2}	Single Pulse Avalanche Energy	510	mJ
E _{AR} ^{a1}	Avalanche Energy ,Repetitive	60	mJ
I _{AR} ^{a1}	Avalanche Current	11.1	A
dv/dt ^{a3}	Peak Diode Recovery dv/dt	5	V/ns
P _D	Power Dissipation	130	W
	Derating Factor above 25°C	1.04	W/°C
T _J , T _{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T _L	MaximumTemperature for Soldering	300	°C



Electrical Characteristics (Tc= 25°C unless otherwise specified)

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V _{DSS}	Drain to Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	500	--	--	V
ΔBV _{DSS} /ΔT _J	Bvdss Temperature Coefficient	I _D =250uA, Reference 25°C	--	0.74	--	V/°C
I _{DSS}	Drain to Source Leakage Current	V _{DS} = 500V, V _{GS} = 0V, T _a = 25°C	--	--	1.0	μA
		V _{DS} =400V, V _{GS} = 0V, T _a = 125°C	--	--	±1.0	
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} =+30V	--	--	±100	nA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} =-30V	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =10V, I _D =4.0A	--	0.68	0.85	Ω
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.0	--	4.0	V
Pulse width tp ≤ 380μs, δ ≤ 2%						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g _{fs}	Forward Transconductance	V _{DS} =50V, I _D =4.0A	--	3	--	S
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1.0MHz	--	904	--	pF
C _{oss}	Output Capacitance		--	120	--	
C _{rss}	Reverse Transfer Capacitance		--	2.69	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =9.0A V _{DD} = 250V V _{GS} = 10V R _G = 25Ω	--	29.2	--	ns
t _r	Rise Time		--	59.6	--	
t _{d(OFF)}	Turn-Off Delay Time		--	41.3	--	
t _f	Fall Time		--	29.2	--	
Q _g	Total Gate Charge	I _D =9.0A V _{DD} =400V V _{GS} = 10V	--	14.7	--	nC
Q _{gs}	Gate to Source Charge		--	5.6	--	
Q _{gd}	Gate to Drain ("Miller") Charge		--	4.4	--	



Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	9	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	32	A
V_{SD}	Diode Forward Voltage	$I_S=9.0A, V_{GS}=0V$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$I_S=9.0A, T_J = 25^\circ C$ $dI_F/dt=100A/us,$ $V_{GS}=0V$	--	25	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.0	--	nC
I_{RRM}	Reverse Recovery Current		--	8.0	--	A
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	0.96	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	110	$^\circ C/W$

^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

^{a2}: $L=10.0mH, I_D=8A, Start T_J=25^\circ C$

^{a3}: $I_{SD}=8A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, Start T_J=25^\circ C$

Typical Characteristics

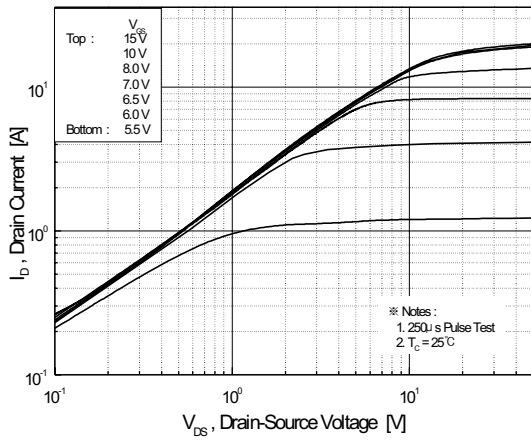


Figure 1. On-Region Characteristics

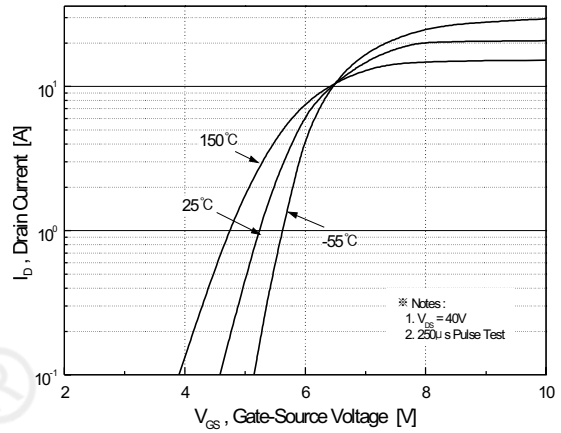


Figure 2. Transfer Characteristics

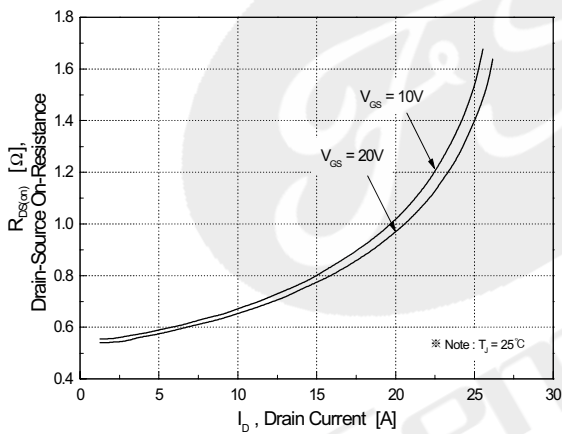


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

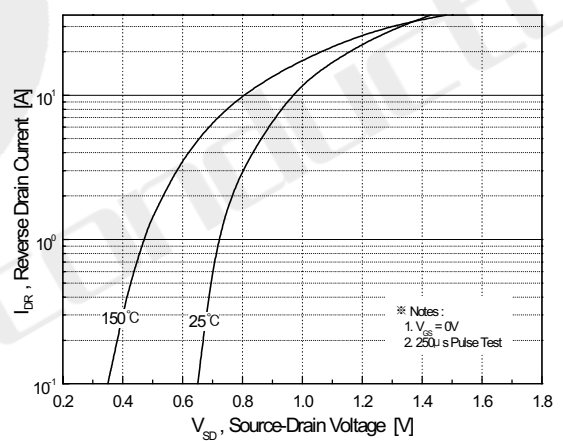


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

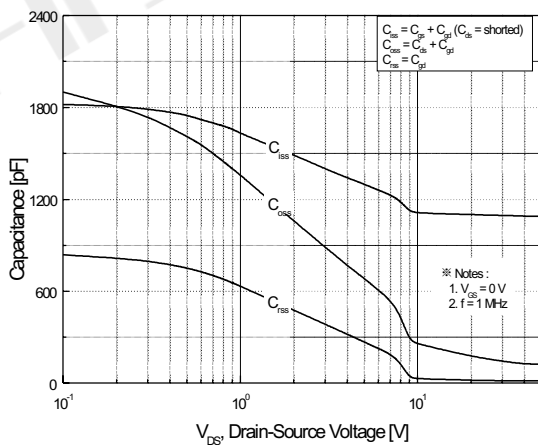


Figure 5. Capacitance Characteristics

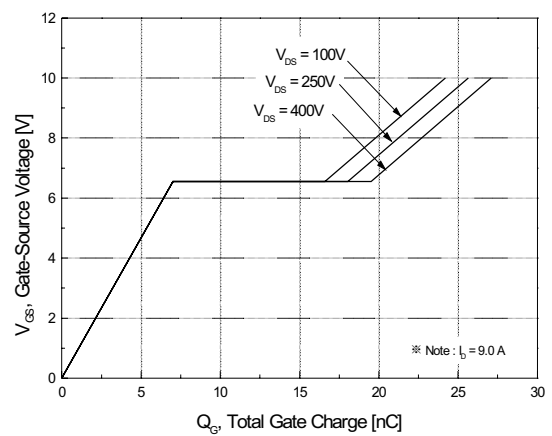


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

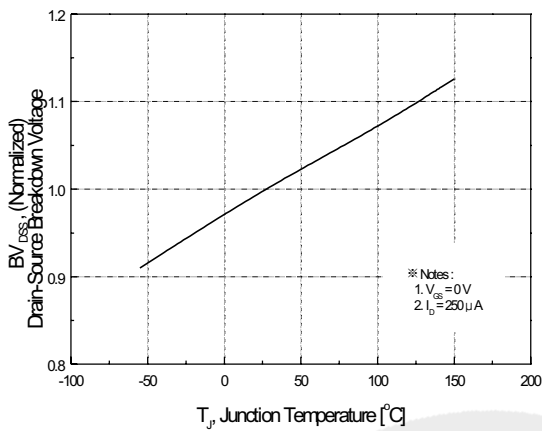


Figure 7. Breakdown Voltage Variation vs. Temperature

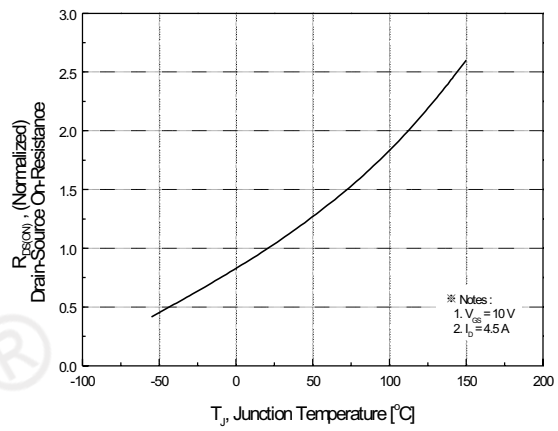


Figure 8. On-Resistance Variation vs. Temperature

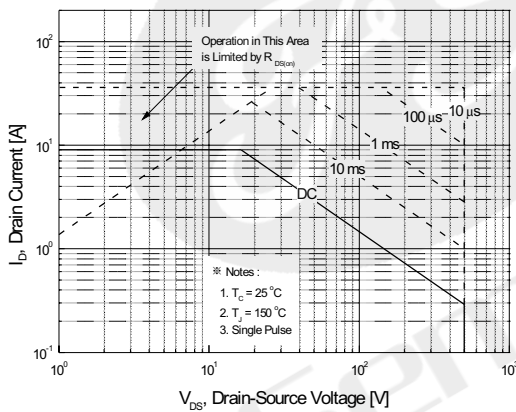


Figure 9. Maximum Safe Operating Area

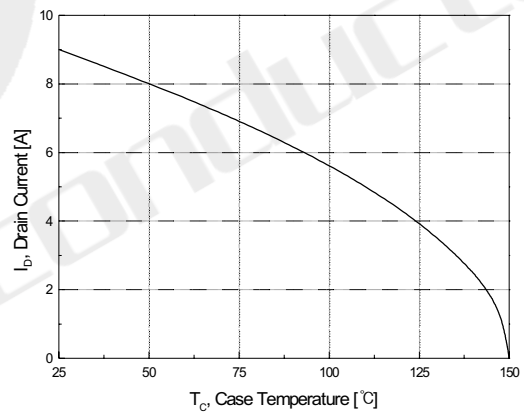


Figure 10. Maximum Drain Current vs. Case Temperature

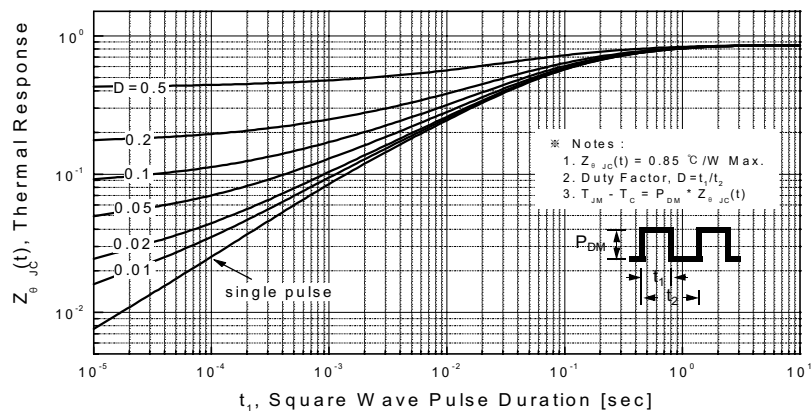
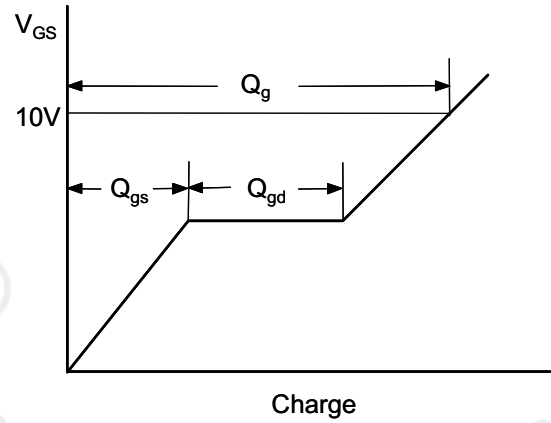
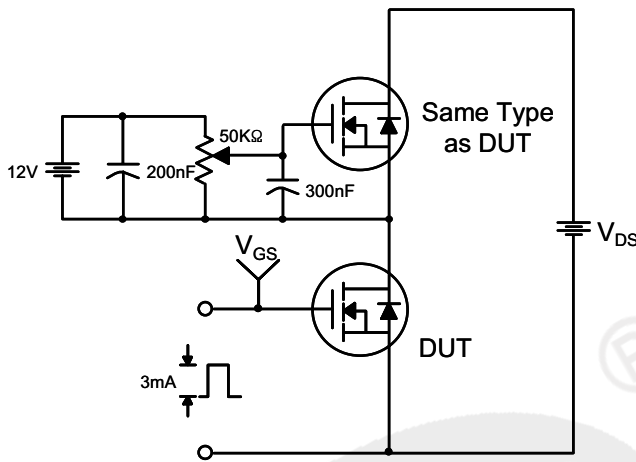
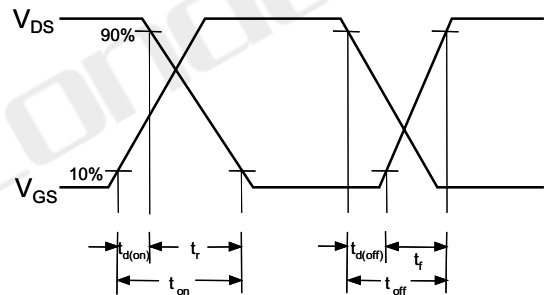
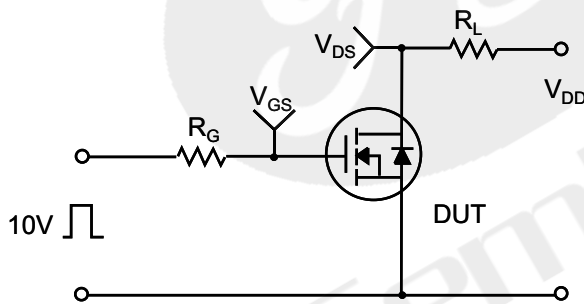


Figure 11. Transient Thermal Response Curve

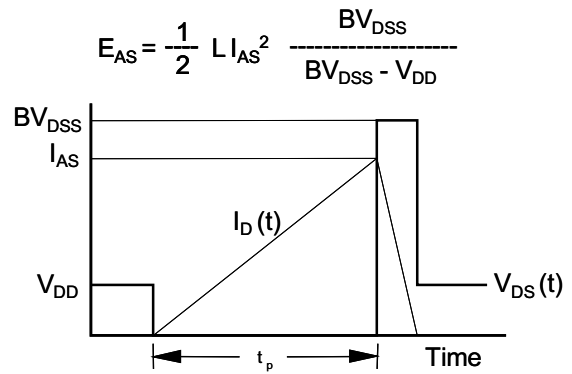
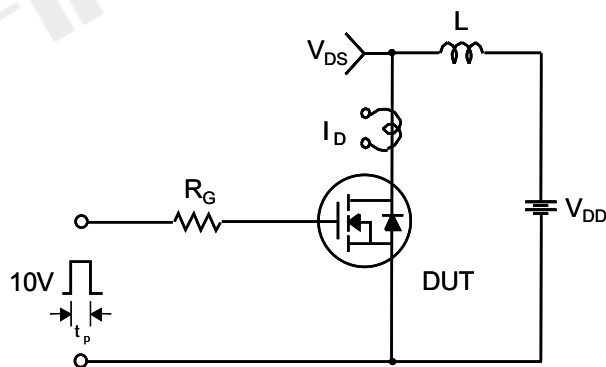
Gate Charge Test Circuit & Waveform



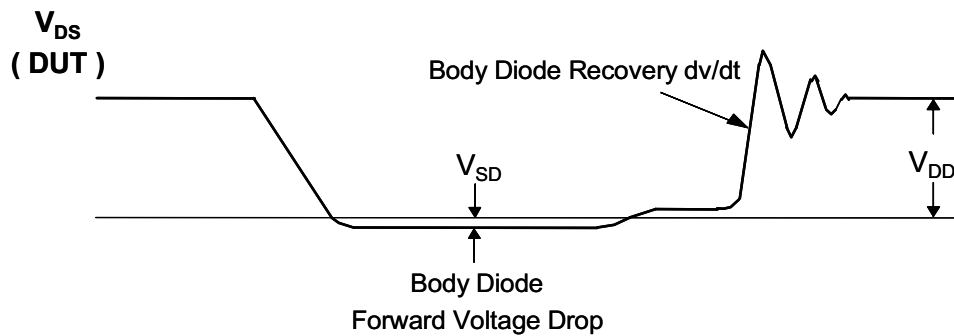
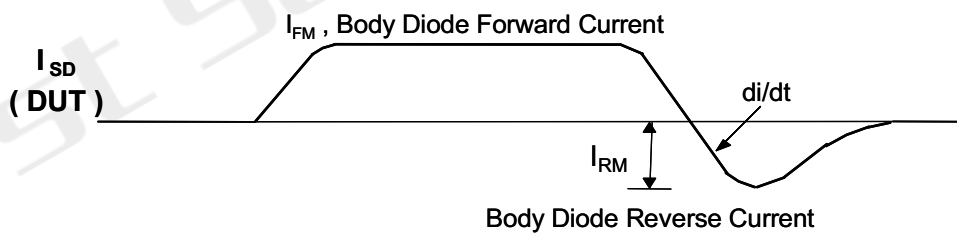
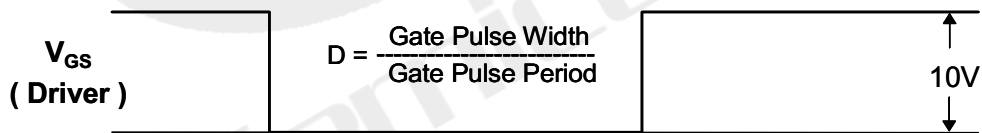
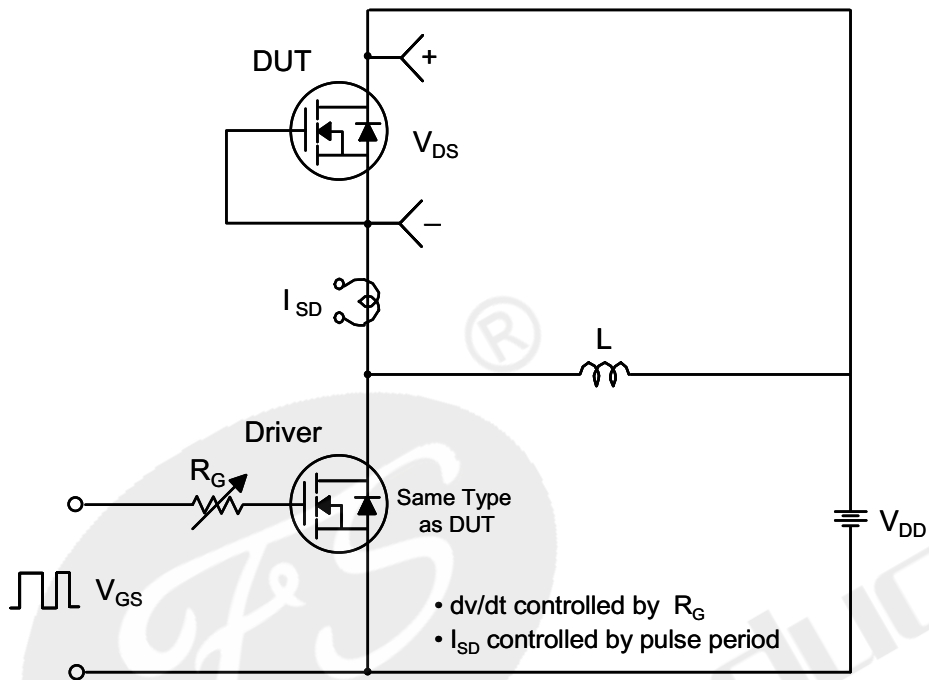
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

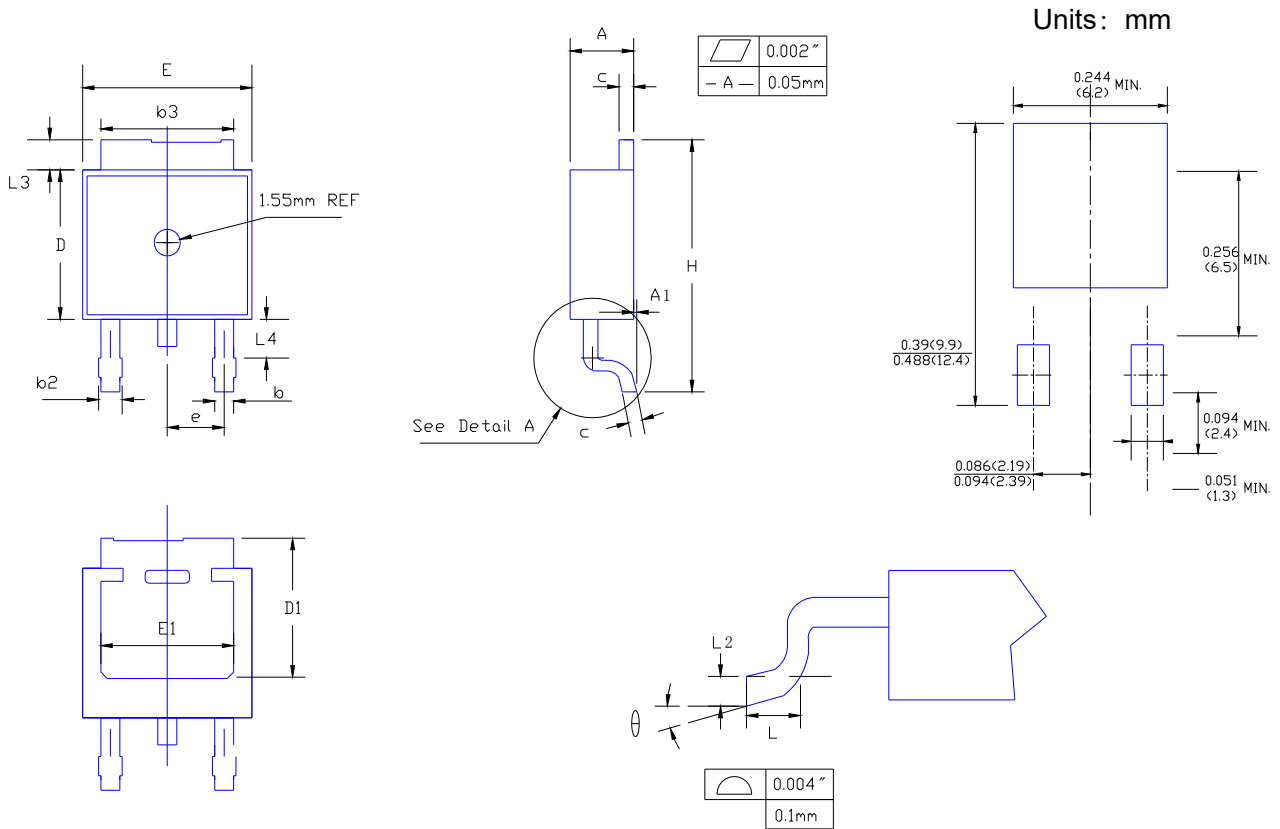


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimensions

TO-252



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.086	0.094	2.19	2.38	
A1	-	0.005	-	0.13	
b	0.025	0.035	0.64	0.89	
b2	0.033	0.045	0.84	1.14	
b3	0.205	0.215	5.21	5.46	
c	0.018	0.024	0.46	0.61	
D	0.241	0.249	6.12	6.32	
D1	0.205	-	5.21	-	
E	0.250	0.265	6.35	6.73	
E1	0.190	-	4.83	-	
e	0.090 BSC.		2.29 BSC.		
H	0.380	0.410	9.65	10.41	
L	0.055	0.070	1.40	1.78	
L2	0.020 BSC.		0.51 BSC.		
L3	0.035	0.050	0.89	1.27	
L4	0.025	0.040	0.64	1.01	
θ	0°	8°	0°	8°	



Declaration

- FIRST reserves the right to change the specifications, the same specifications of products due to different packaging line mold, the size of the appearance will be slightly different, shipped in kind, without notice! Customers should obtain the latest version information before ordering, and verify whether the relevant information is complete and up-to-date.
- Any semiconductor product under certain conditions has the possibility of failure or failure, The buyer has the responsibility to comply with safety standards and take safety measures when using FIRST products for system design and manufacturing, To avoid To avoid potential failure risks, which may cause personal injury or property damage!
- Product promotion endless, our company will wholeheartedly provide customers with better products!

ATTACHMENT

Revision History

Date	REV	Description	Page
2018.01.01	1.0	Initial release	