

Description

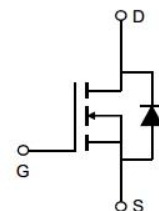
The IRFR3410 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

Key Characteristics

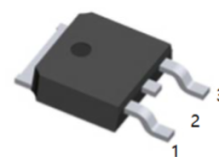
- $V_{DS} = 100V, I_D = 30A$
 $R_{DS(ON)} < 30m\Omega @ V_{GS}=10V$
- High density cell design for lower R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high EAS
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard switched and High frequency circuits
- Uninterruptible power supply



Schematic diagram



1.G 2.D 3.S
TO-252(DPAK) top view

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	30	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	100	A
Maximum Power Dissipation ($T_c=25^\circ\text{C}$)	P_D	70	W
Single pulse avalanche energy ^(Note 2)	E_{AS}	96	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.5	$^{\circ}\text{C}/\text{W}$
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Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Drain-Source On-State Resistance ^(Note 3)	$R_{DS(ON)}$	$V_{GS}=10V, I_D=12A$	-	25	30	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=15A$	-	11	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$	-	2550	-	pF
Output Capacitance	C_{oss}		-	225	-	pF
Reverse Transfer Capacitance	C_{rss}		-	205	-	pF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=50V,$ $I_D=20A,$ $V_{GS}=10V,$ $R_{GEN}=10\Omega$	-	29	-	nS
Turn-on Rise Time	t_r		-	13	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	58.2	-	nS
Turn-Off Fall Time	t_f			13.4	-	nS
Total Gate Charge	Q_g	$V_{DS}=80V, I_D=20A, V_{GS}=10V$	-	55	-	nC
Gate-Source Charge	Q_{gs}		-	15	-	nC
Gate-Drain Charge	Q_{gd}		-	20	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=20A$	-	-	1.2	V
Reverse Recovery Time	T_{rr}	$T_J=25^{\circ}C, I_F=10A,$ $di/dt=100A/\mu S^2$ ^{note3?}	-	58	-	nS
Reverse Recovery Charge	Q_{rr}		-	110	-	nC

Notes:

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2.EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_{GS}=10V, L=0.5mH, R_g=25\Omega$
- 3.Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- 4.Guaranteed by design, not subject to production.

Characteristics Curves

Figure 1 Output Characteristics

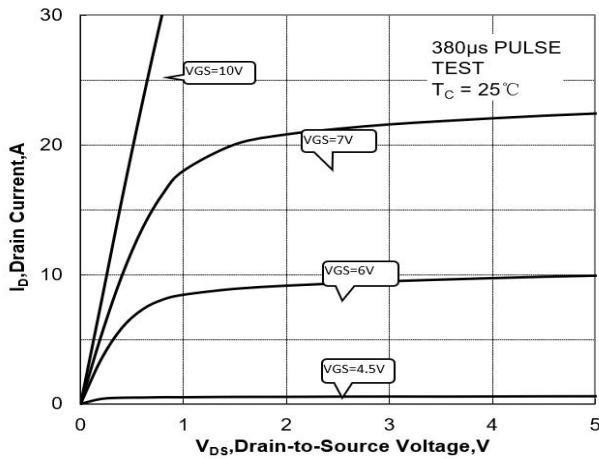


Figure 3 On-Resistance vs. I_D and V_{GS}

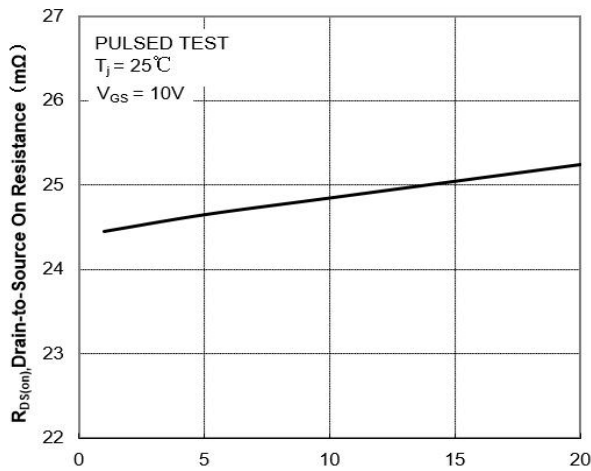


Figure 5 On-Resistance vs. V_{GS}

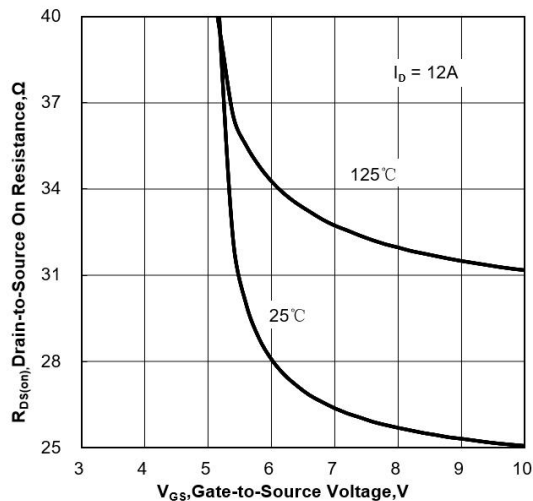


Figure 2 Transfer Characteristics

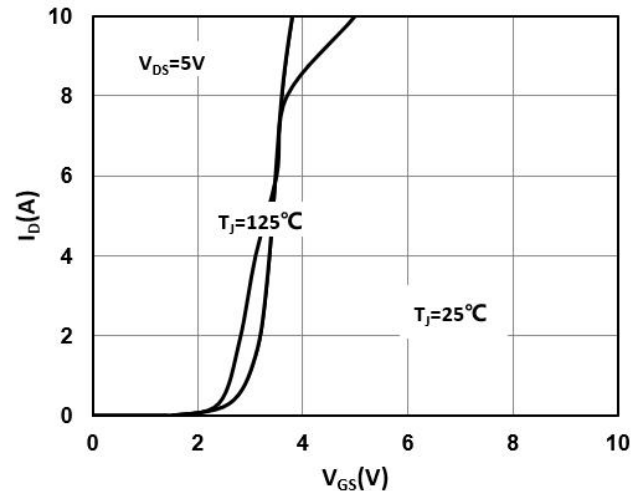


Figure 4 On-Resistance vs. Junction Temperature

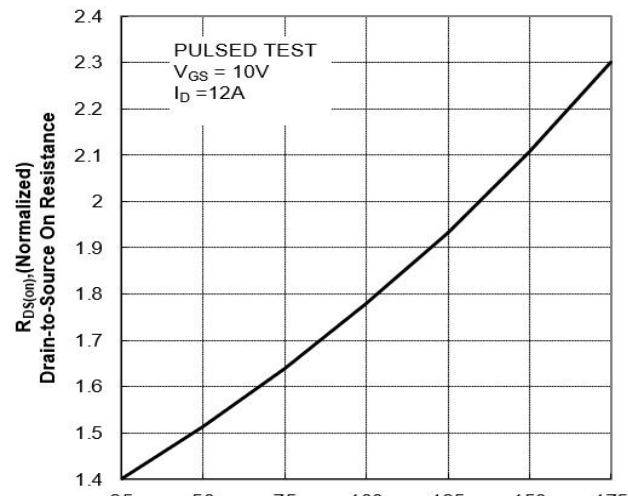


Figure 6 Body Diode Forward Voltage

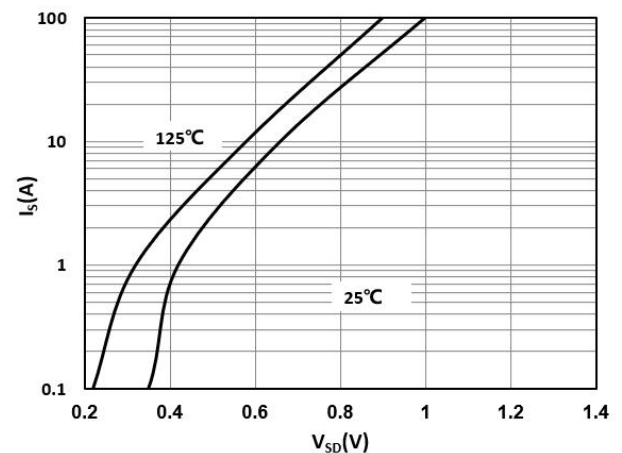


Figure 7 Gate-Charge Characteristics

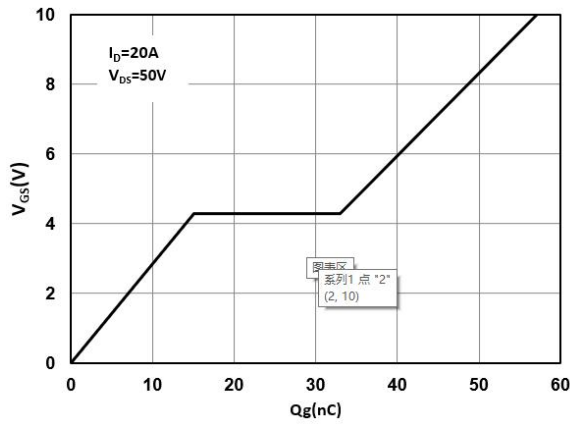


Figure 8 Capacitance Characteristics

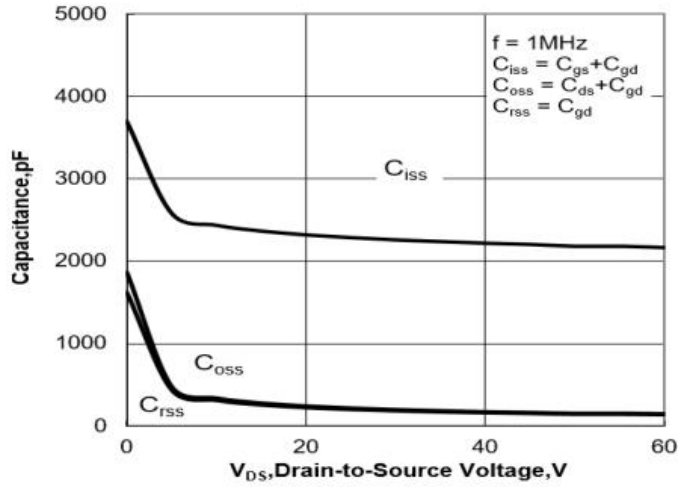


Figure 9 Maximum Forward Biased Safe Operation Area

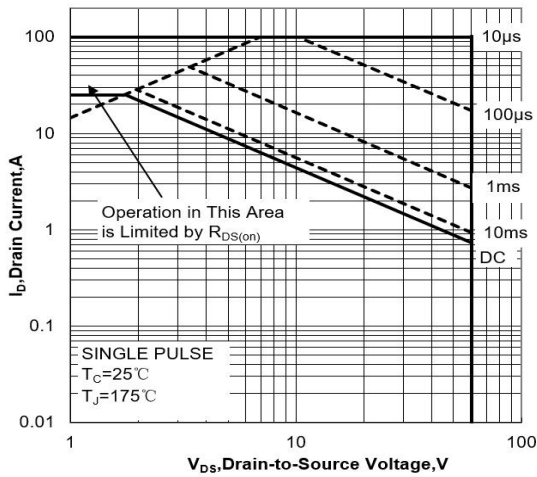


Figure 10 Single Pulse Power Rating Junction-to-Ambient

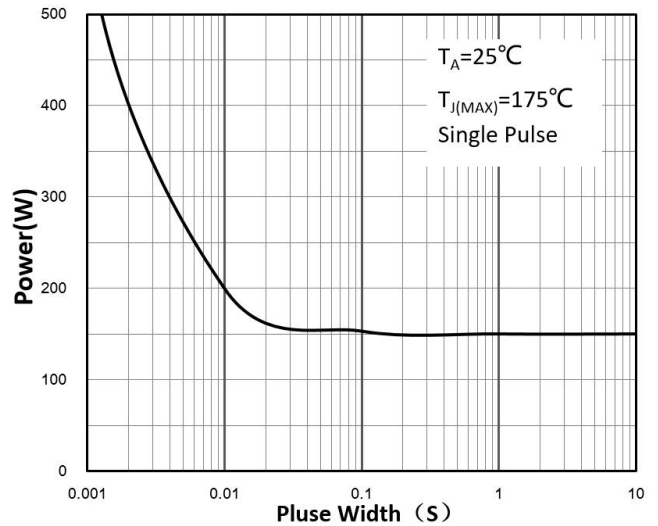
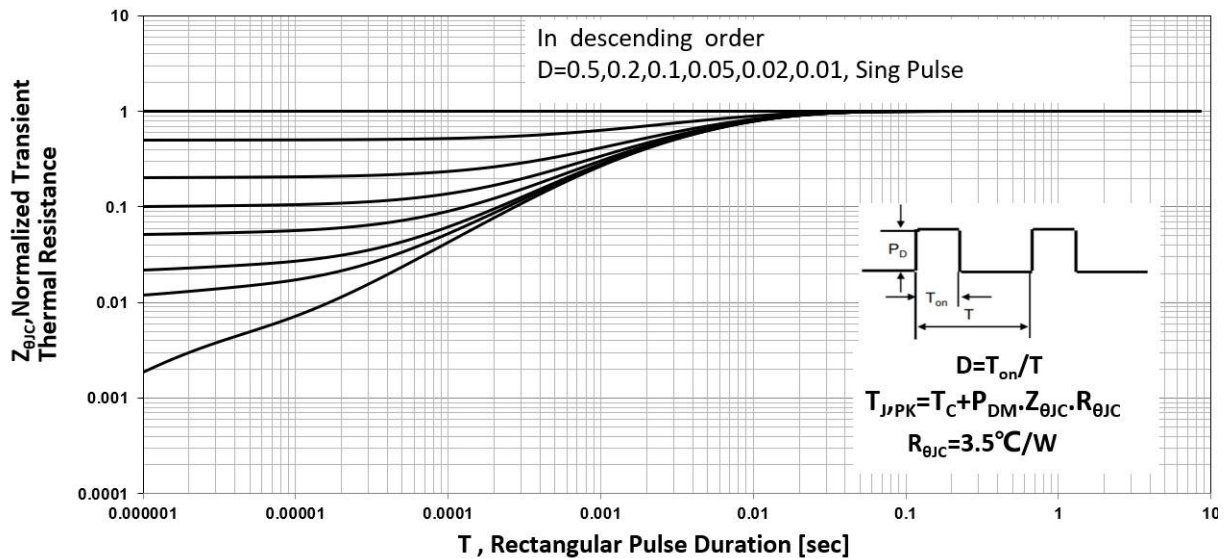
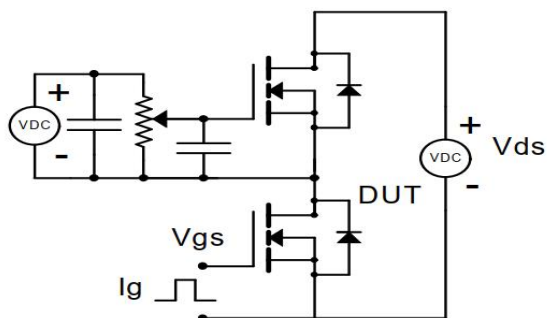


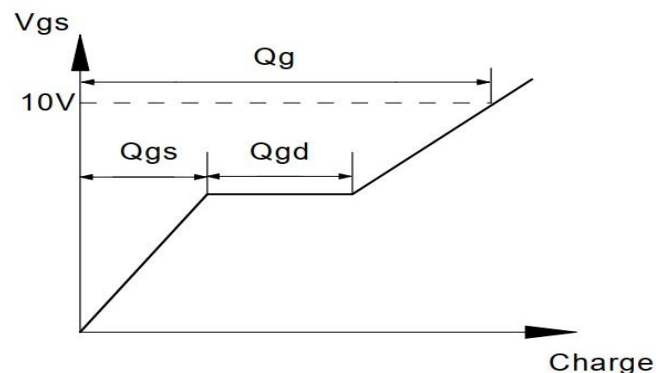
Figure 11 Normalized Maximum Transient Thermal Impedance



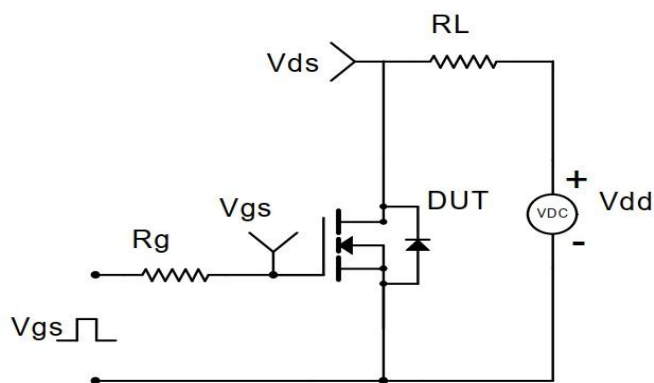
Gate Charge Test Circuit



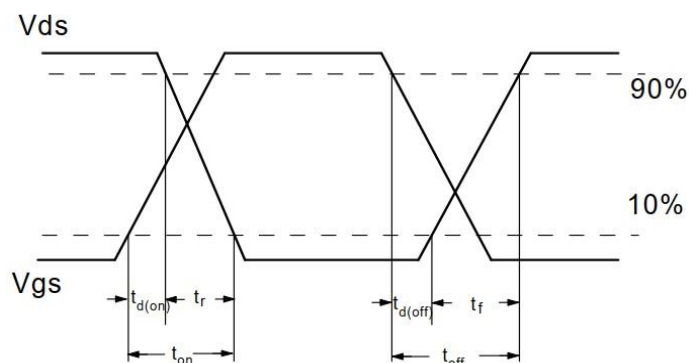
Gate Charge Test Waveform



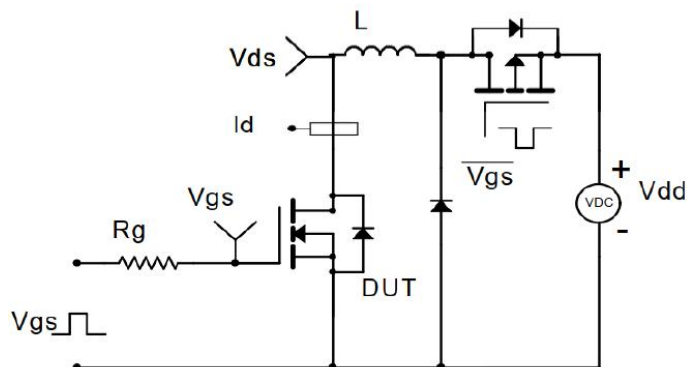
Resistive Switching Test Circuit



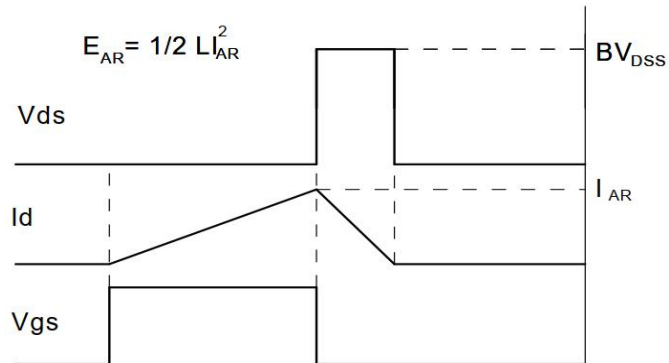
Resistive Switching Test Waveforms



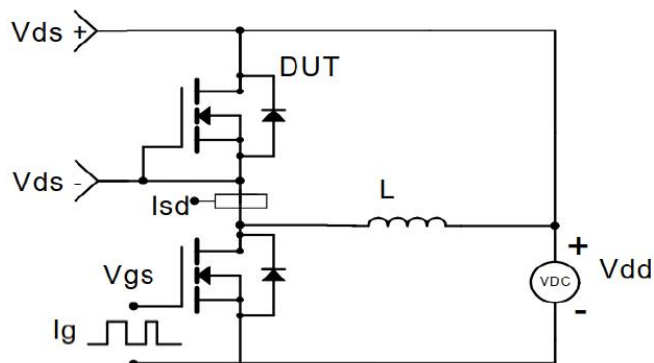
Unclamped Inductive Switching (UIS) Test Circuit



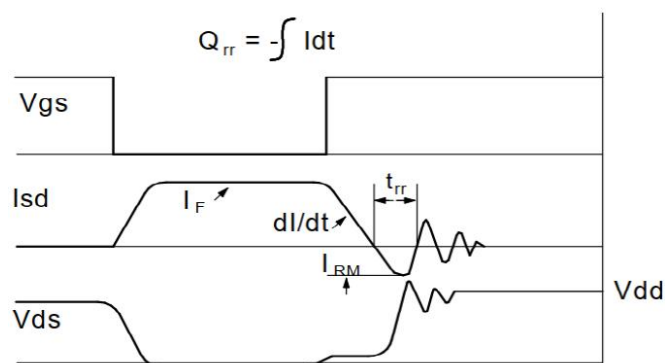
Unclamped Inductive Switching (UIS) Test Waveforms



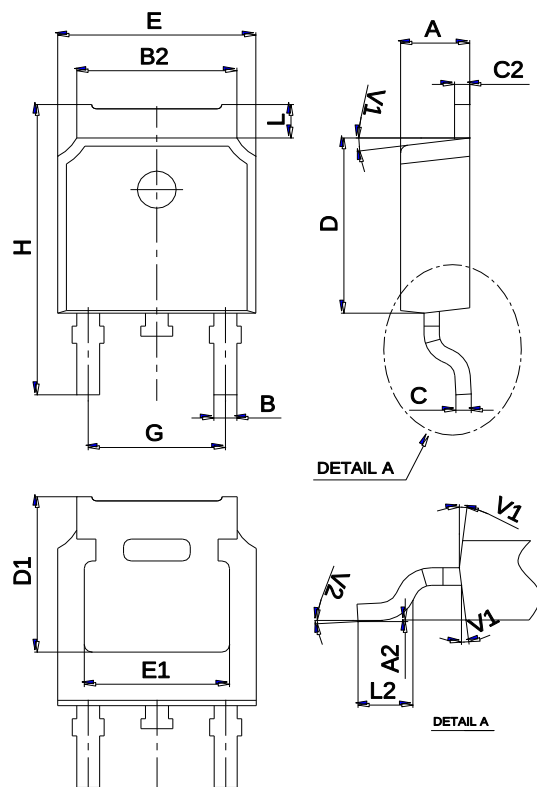
Diode Recovery Test Circuit



Diode Recovery Test Waveforms

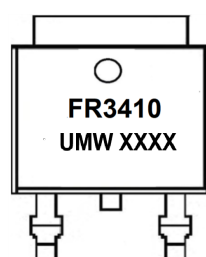


Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRFR3410TR	TO-252	2500	Tape and reel