UMW IRF7389TR

30V N-Channel MOSFET
-30V P-Channel MOSFET

1.Description

The SOP-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications.

2.1Features

- Generation V Technology
- Ultra Low On-Resistance
- Complimentary Half Bridge
- Surface Mount
- Fully Avalanche Rated
- Lead-Free

2.2Features(N-Ch)

- $V_{DS\ (V)}$=30
- I_D=7.3A
- $R_{DS(ON)}$<29mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<46mΩ(V_{GS}=4.5V)

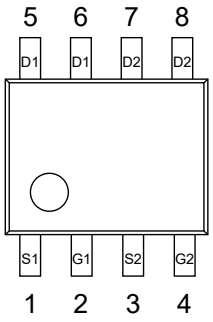
2.3Features(P-Ch)

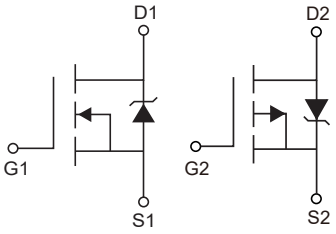
- $V_{DS\ (V)}$=-30V
- I_D=-5.3A
- $R_{DS(ON)}$<58Ω(V_{GS}=-10V)
- $R_{DS(ON)}$<98mΩ(V_{GS}=-4.5V)

3.Pinning Information

Pin	Symbol	Description
2,4	G1,G2	GATE
1,3	S1,S2	SOURCE
5,6,7,8	D1,D2	DRAIN

SOP-8





4.Absolute Maximum Ratings

Parameter		Symbol	N-Channel	P-Channel	Units
Drain-Source Voltage		V_{DS}	30	-30	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current ⑤	T_A= 25°C	I_D	7.3	-5.3	A
	T_A=70°C		5.9	-4.2	A
Pulsed Drain Current		I_{DM}	30	-30	A
Continuous Source Current (Diode Conduction)		I_S	2.5	-2.5	A
Maximum Power Dissipation ⑤	T_A= 25°C	P_D	2.5		W
	T_A=70°C		1.6		W
Single Pulse Avalanche Energy		E_{AS}	82	140	mJ
Avalanche Current		I_{AR}	4	-2.8	A
Repetitive Avalanche Energy		E_{AR}	0.2	0.2	mJ
Peak Diode Recovery dv/dt ②		dv/dt	3.8	-2.2	V/ns
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	-55 to 150	°C

5.Thermal Characteristics

Parameter	Symbol	Max.	Units
Maximum Junction-to-Ambient ⑤	$R_{\theta JA}$	62.5	°C/W

6.Electrical Characteristics T_J=25°C

Parameter	Symbol		Conditions	Min	Typ	Max	Units
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	N-Ch	I_D=250μA, V_{GS}=0V	30			V
		P-Ch	I_D=-250μA, V_{GS}=0V	-30			V
Breakdown Voltage Temp Coefficient Current	$\frac{\Delta V_{(BR)DSS}}{\Delta T_J}$	N-Ch	I_D=1mA,Reference to 25°C		0.022		V/°C
		P-Ch	I_D=-1mA,Reference to 25°C		0.022		V/°C
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	N-Ch	V_{GS}=10V, I_D=5.8A ④		23	29	mΩ
		N-Ch	V_{GS}=4.5V, I_D=4.7A ④		32	46	mΩ
		P-Ch	V_{GS}=-10V, I_D=-4.9A ④		42	58	mΩ
		P-Ch	V_{GS}=-4.5V, I_D=-3.6A ④		76	98	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	N-Ch	V_{DS}=V_{GS}, I_D=250μA	1			V
		P-Ch	V_{DS}=V_{GS}, I_D=-250μA	-1			V
Forward Transconductance	g_{fs}	N-Ch	V_{DS}=15V, I_D=5.8A ④		14		S
		P-Ch	V_{DS}=-15V, I_D=-4.9A ④		7.7		S
Drain-to-Source Leakage Current	I_{DSS}	N-Ch	V_{DS}=24V, V_{GS}=0V			1	μA
		P-Ch	V_{DS}=-24V, V_{GS}=0V			-1	μA
		N-Ch	V_{DS}=24V, V_{GS}=0V, T_J=55°C			25	μA
		P-Ch	V_{DS}=-24V, V_{GS}=0V, T_J=55°C			-25	μA
Gate-to-Source ForwardLeakage	I_{GSS}	N-P	V_{GS}=±20V			±100	nA
Total Gate Charge	Q_g	N-Ch	N-Ch: ④ I_D=5.8A, V_{DS}=15V, V_{GS}=10V P-Ch: I_D=-4.9A,V_{DS}=-15V,V_{GS}=-10V		22	33	nC
		P-Ch			23	34	nC
Gate-to-Source Charge	Q_{gs}	N-Ch			2.6	3.9	nC
		P-Ch			3.8	5.7	nC
Gate-to-Drain ("Miller") Charge	Q_{gd}	N-Ch			6.4	9.6	nC
		P-Ch			5.9	8.9	nC
Turn-On Delay Time	$t_{D(on)}$	N-Ch	N-Ch: ④ V_{DD}=15A, I_D=1A R_G=6Ω, R_D=15Ω		8.1	12	ns
		P-Ch			13	19	ns
Rise Time	t_r	N-Ch			8.9	13	ns
		P-Ch			13	20	ns

Tum-Off Delay Time	$t_{D(off)}$	N-Ch	P-Ch: ④ V_{DD}=-15A, I_D=-1A R_G=6Ω, R_D=15Ω		26	39	ns
		P-Ch			34	51	ns
Fall Time	t_f	N-Ch			17	26	ns
		P-Ch			32	48	ns
Input Capacitance	C_{iss}	N-P	N-Ch: V_{GS}=0V, V_{DS}=25V, f=1MHz P-Ch: V_{GS}=0V, V_{DS}=-25V, f=1MHz		650		pF
		N-P			710		pF
Output Capacitance	C_{oss}	N-Ch			320		pF
		P-Ch			380		pF
ReverseTransferCapacitance	C_{rss}	N-Ch			130		pF
		P-Ch			180		pF
Continuous Source Current (Body Diode)	I_S	N-Ch				2.5	A
		P-Ch				-2.5	A
Pulsed Source Current (Body Diode) ①	I_{SM}	N-Ch				30	A
		P-Ch				-30	A
Diode Forward Voltage	V_{SD}	N-Ch	T_J=25°C, I_S=1.7A,V_{GS}=0V ③		0.78	1	V
		P-Ch	T_J=25°C, I_S=-1.7A,V_{GS}=0V ③		-0.78	-1	V
Reverse Recovery Time	t_{rr}	N-Ch	N-Ch: T_J=25°C I_F=1.7A, di/dt =100A/μs P-Ch: T_J=25°C I_F=-1.7A, di/dt=100A/μs ④		45	68	ns
		P-Ch			44	66	ns
Reverse Recovery Charge	Q_{rr}	N-Ch			58	87	nC
		P-Ch			42	63	nC

Notes:

① Repetitive rating; pulse width limited bymax.junction temperature.(See fig. 22)

② N-Channel I_{SD}≤4A, di/dt ≤74A/μs, V_{DD}≤$V_{(BR)DSS}$, T_J≤ 150°C.

P-Channel I_{SD}≤ -2.8A, di/dt ≤ 150Aμs, V_{DD}≤$V_{(BR)DSS}$, T_J≤ 150°C.

③ N-Channel Starting T_J=25°C, L=10mH, R_G=25Ω, I_{AS}= 4.0A.(See Figure 12)

P-Channel Starting T_J= 25°C, L=35mH, R_G=25Ω, I_{AS}= -2.8A.

④ Pulse width ≤ 300μs; duty cycle ≤ 2%.

⑤ Surface mounted on FR-4 board, t≤ 10sec.

7.1Typical Characterisitics (N-Channel)

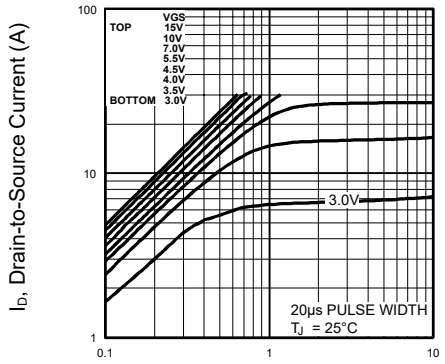


Figure 1: Typical Output Characteristics

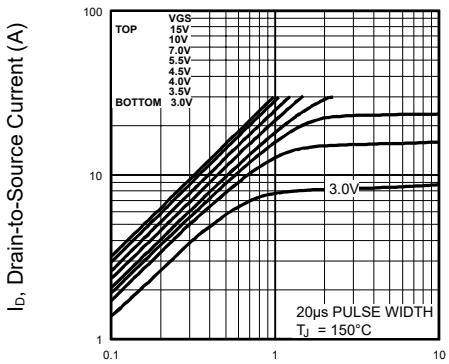


Figure 2: Typical Output Characteristics

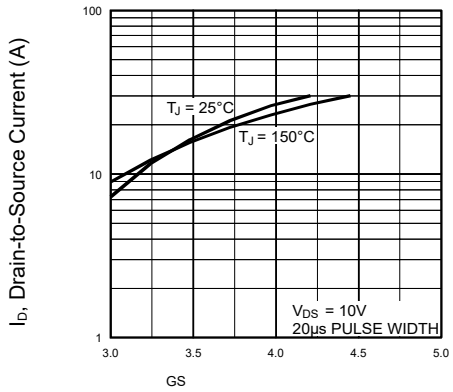


Figure 3: Typical Output Characteristics

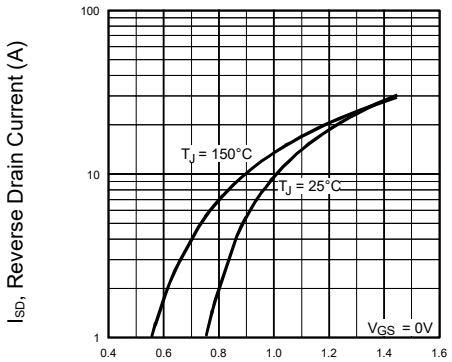


Figure 4: Typical Source-Drain Diode Forward Voltage

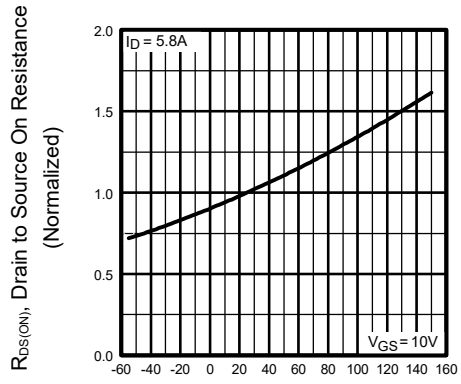


Figure 5: Normalized On-Resistance VS. Temperature

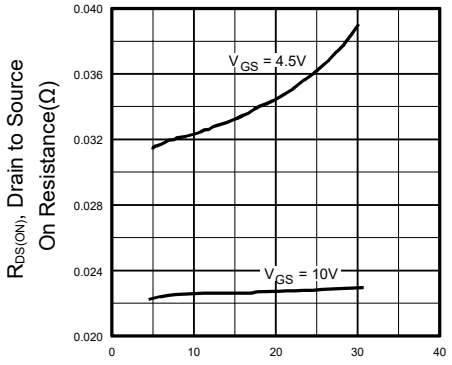


Figure 6: Typical On-Resistance Vs. DrainCurrent

7.2Typical Characterisitics (N-Channel)

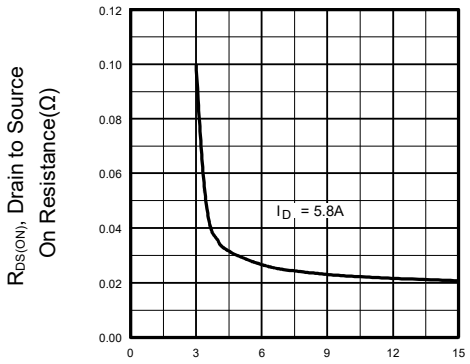


Figure 7: Typical On-Resistance Vs. GateVoltage

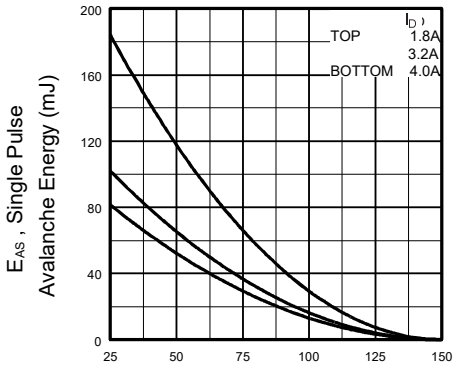


Figure 8: Maximum Avalanche EnergyVs. Drain Curent

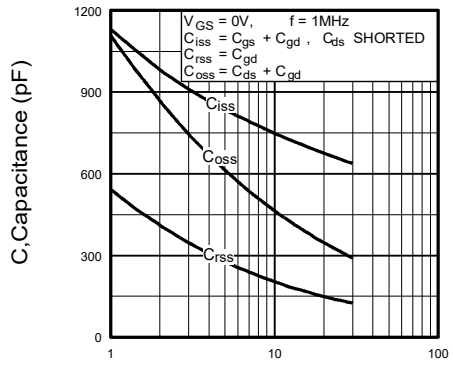


Figure 9: Typical Capacitance Vs. Drain-to-Source Voltage

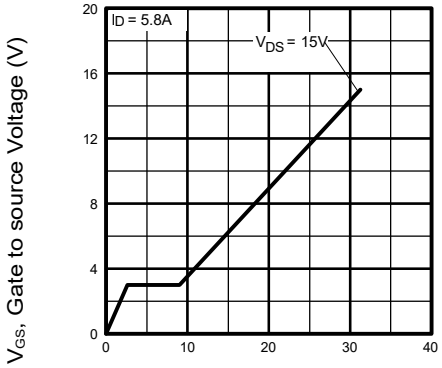


Figure 10: Typical Gate Charge Vs. Gate-to-Source Voltage

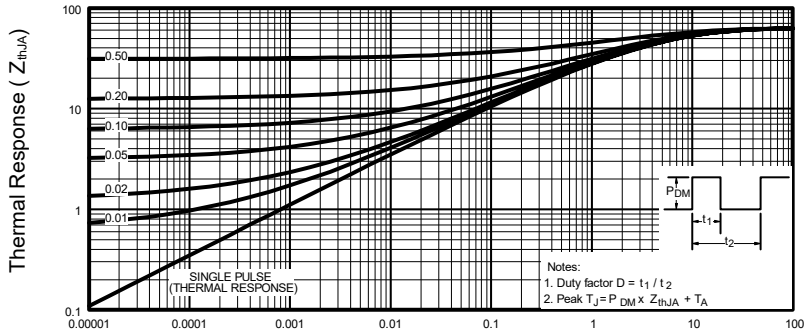
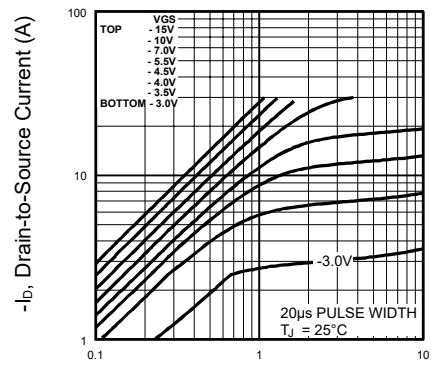


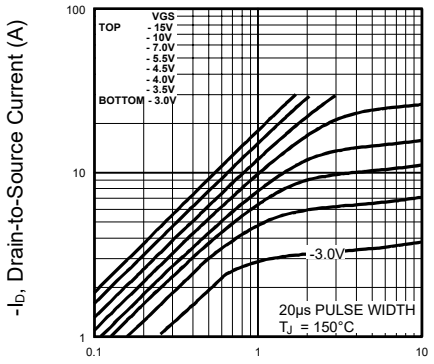
Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

7.3Typical Characterisitics (P-Channel)



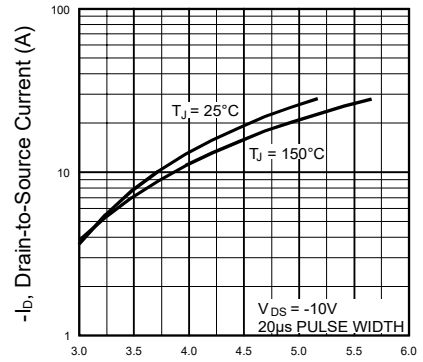
$-V_{DS}$,Drain-to-Source Voltage (V)

Figure 12: Typical Output Characteristics



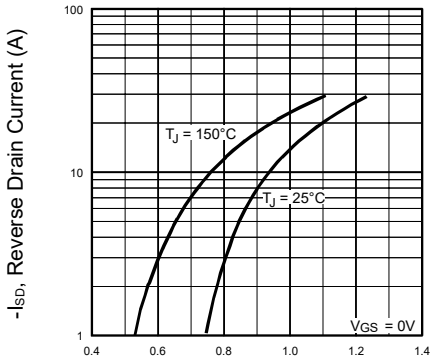
$-V_{DS}$,Drain-to-Source Voltage (V)

Figure 13: Typical Output Characteristics



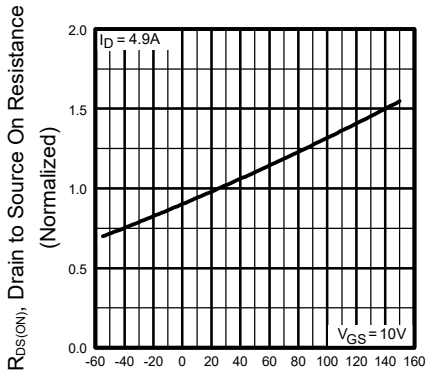
$-V_{GS}$,Gate-to-Source Voltage (V)

Figure 14: Typical Output Characteristics



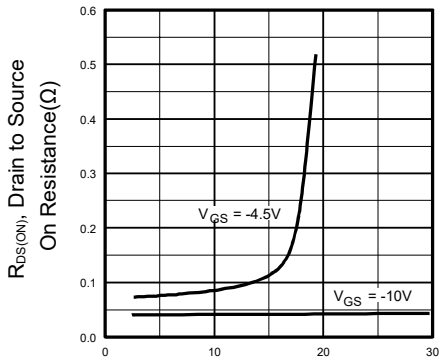
$-V_{SD}$,Source to Drain Voltage (V)

Figure 15: Typical Source-Drain Diode Forward Voltage



T_J,Junction Temperature (°C)

Figure 16: Normalized On-Resistance VS. Temperature



$-I_D$,Drain Current (A)

Figure 17: Typical On-Resistance Vs. DrainCurrent

7.4Typical Characterisitics (P-Channel)

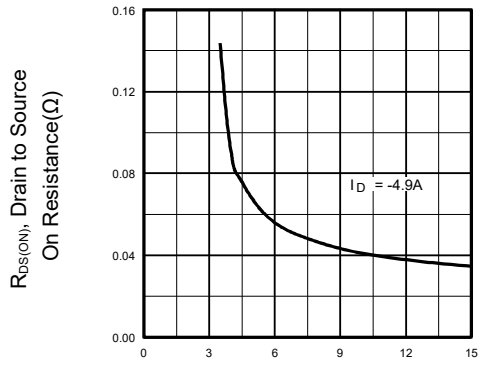


Figure 18: Typical On-Resistance Vs. GateVoltage

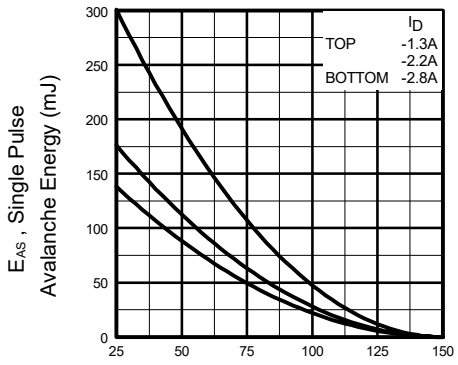


Figure 19: Maximum Avalanche EnergyVs. Drain Curent

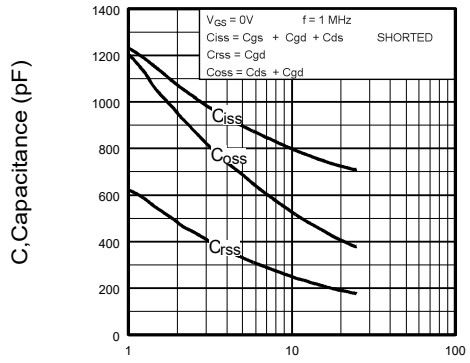


Figure 20: Typical Capacitance Vs. Drain-to-Source Voltage

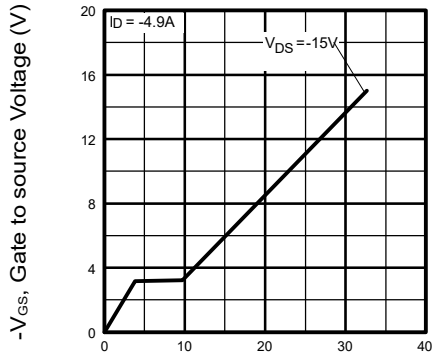


Figure 21: Typical Gate Charge Vs. Gate-to-Source Voltage

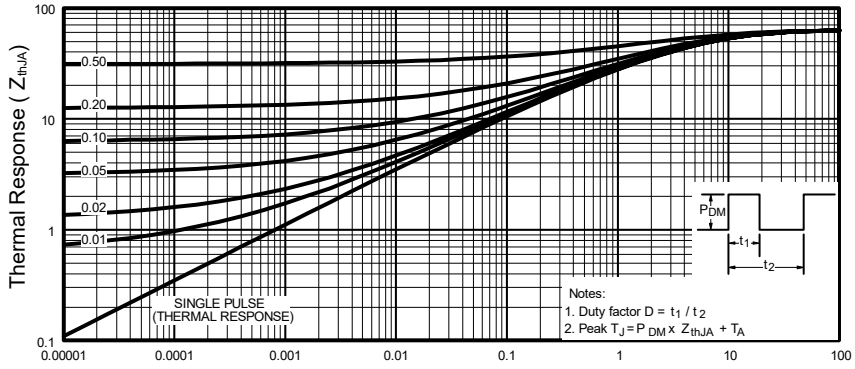
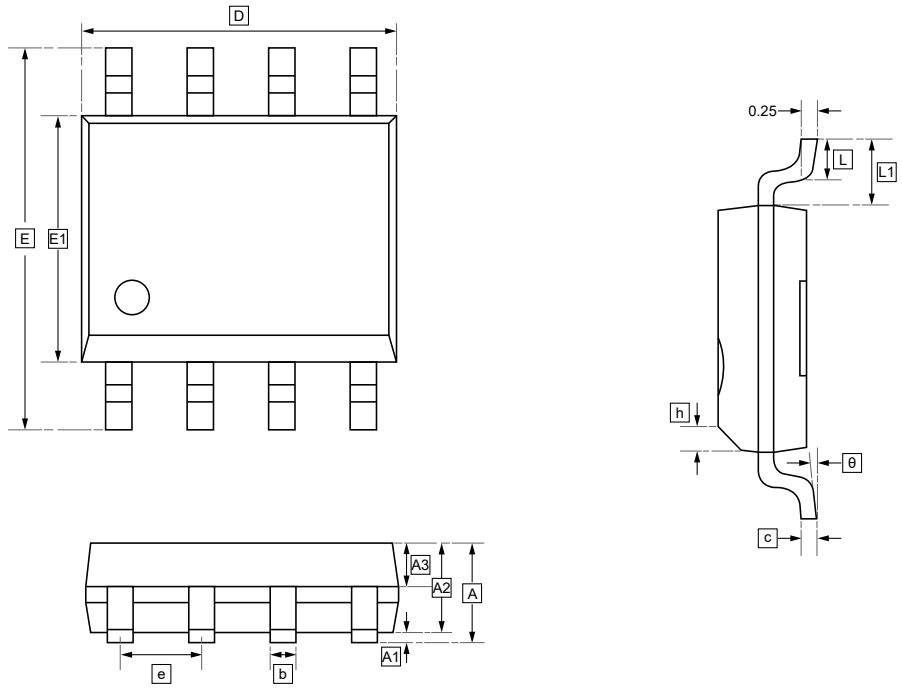


Figure 22: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

8.SOP-8 Package Outline Dimensions

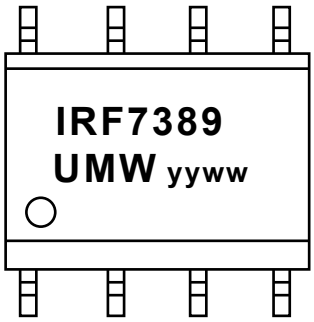


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.70	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.10	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRF7389TR	SOP-8	3000	Tape and reel

10.Disclaimer

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