

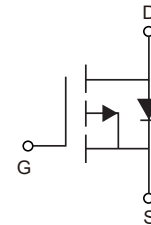
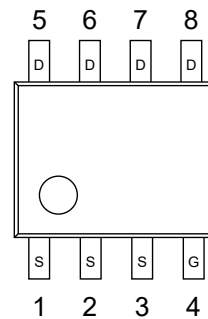
1.Features

- $V_{DS(V)} = -30V$
- $I_D = -20A$
- $Q_g = 58nC$
- $R_{DS(ON)} < 4.6m\Omega (V_{GS} = -10V)$
- $R_{DS(ON)} < 6.8m\Omega (V_{GS} = -4.5V)$
- Industry-standard pinout SOP-8 Packag
- Compatible with Existing Surface Mount Techniques
- RoHS Compliant, Halogen-Free
- MSL1, Industrial qualification

2.Pinning information

Pin	Symbol	Description
1,2,3	S	SOURCE
4	G	GATE
5,6,7,8	D	DRAIN

SOP-8



3.Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain- Source Voltage		V_{DS}	-30	V
Gate-to-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current, $V_{GS}=10V$	$T_A=25^\circ C$	I_D	-20	A
Continuous Drain Current, $V_{GS}=10V$	$T_A=70^\circ C$		-16	A
Pulsed Drain Current ①		I_{DM}	-160	A
Power Dissipation ④	$T_A=25^\circ C$	P_D	2.5	W
Power Dissipation ④	$T_A=70^\circ C$		1.6	W
Linear Derating Factor			0.02	W/°C
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C



4. Electrical Characteristics $T_J=25^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-30			V
Breakdown Voltage Temp. Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=-1\text{mA}$, Reference to 25°C		0.02		$\text{V}/^\circ\text{C}$
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10\text{V}$, $I_D=-20\text{A}$ ③		3.9	4.6	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}$, $I_D=-16\text{A}$ ③		5.8	6.8	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=-100\mu\text{A}$	-1.3	-1.8	-2.4	V
Gate Threshold Voltage Coefficient	$\Delta V_{GS(th)}$			-5.8		$\text{mV}/^\circ\text{C}$
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=-24\text{V}$, $V_{GS}=0\text{V}$			-1	μA
		$V_{DS}=-24\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^\circ\text{C}$			-150	μA
Gate-to-Source Forward Leakage	I_{GSS}	$V_{GS}=-20\text{V}$			-100	nA
Gate-to-Source Reverse Leakage		$V_{GS}=20\text{V}$			100	nA
Forward Transconductance	g_{FS}	$V_{DS}=-10\text{V}$, $I_D=-16\text{A}$	39			S
Total Gate Charge	Q_g	$V_{DS}=-15\text{V}$, $V_{GS}=-4.5\text{V}$, $I_D=-16\text{A}$		58		nC
Total Gate Charge	Q_g	$V_{DS}=-10\text{V}$		110	165	nC
Gate-to-Source Charge	Q_{gs}	$V_{GS}=-15\text{V}$		17		nC
Gate-to-Drain Charge	Q_{gd}	$I_D=-16\text{A}$		28		nC
Gate Resistance	R_g			2.8		Ω
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=-15\text{V}$, $V_{GS}=-4.5\text{V}$ ③ $I_D=-1\text{A}$ $R_G=1.8\Omega$ See Figs. 20a & 20b		25		ns
Rise Time	t_r			47		ns
Turn-Off Delay Time	$t_{D(off)}$			65		ns
Fall Time	t_f			70		ns
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$		5250		pF
Output Capacitance	C_{oss}	$V_{DS}=-15\text{V}$		1300		pF
Reverse Transfer Capacitance	C_{rss}	$f=1.0\text{MHz}$		880		pF
Avalanche Characteristics						
Single Pulse Avalanche Energy ②	E_{AS}				630	mJ
Avalanche Current ①	I_{AR}				-16	A



Diode Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			-2.5	A
Pulsed Source Current (Body Diode) ①	I_{SM}				-160	
Diode Forward Voltage	V_{SD}		$T_J=25^\circ\text{C}, I_S=-2.5\text{A}, V_{GS}=0\text{V}$ ③		-1.2	V
Reverse Recovery Time	t_{rr}	$T_J=25^\circ\text{C}, I_F=-2.5\text{A}, V_{DD}=-24\text{V}$		71	107	ns
Reverse Recovery Charge	Q_{rr}	$di/dt=100\text{A}/\mu\text{s}$ ③		12	18	nC
Thermal Resistance						
Junction-to-Drain Lead ⑤	$R_{\theta JL}$				20	$^\circ\text{C}/\text{W}$
Junction-to-Ambient ④	$R_{\theta JA}$				50	$^\circ\text{C}/\text{W}$

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
 ② Starting $T_J=25^\circ\text{C}$, $L=4.9\text{mH}$, $R_G=25\Omega$, $I_{AS}=-16\text{A}$.
 ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
 ④ When mounted on 1 inch square copper board.
 ⑤ R_θ is measured at T_J of approximately 90°C .



5.1 Typical Characteristics

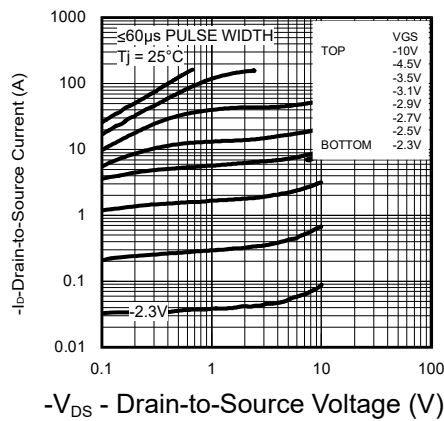


Fig 1. Typical Output Characteristics

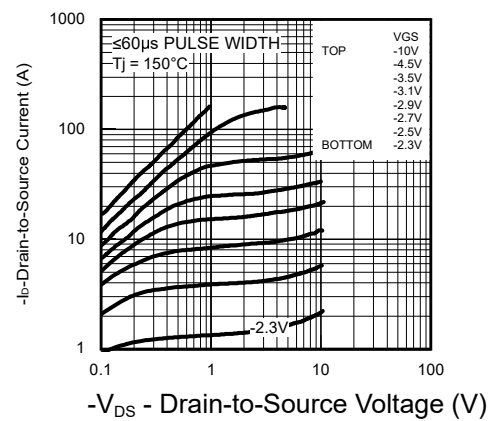


Fig 2. Typical Output Characteristics

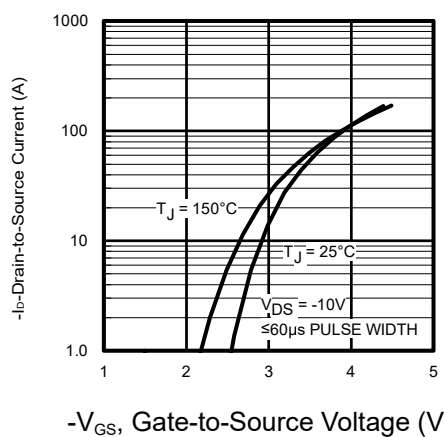


Fig 3. Typical Transfer Characteristics

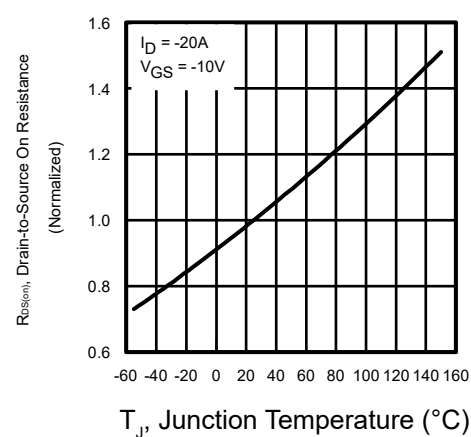
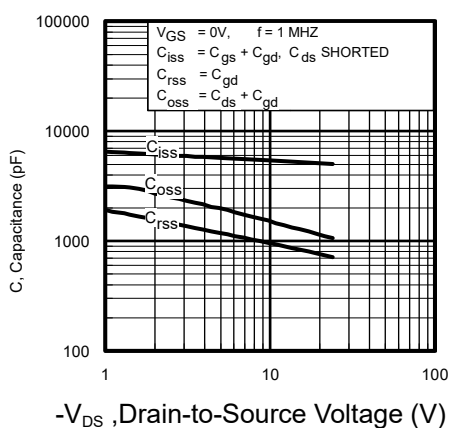
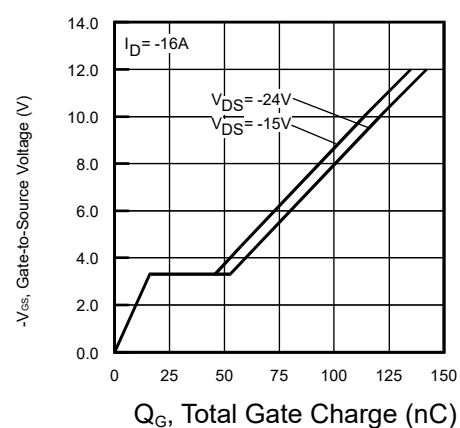


Fig 4. Normalized On-Resistance Vs. Temperature

Fig 5. Typical Capacitance Vs.
Drain-to-Source VoltageFig 6. Typical Gate Charge Vs.
Gate-to-Source Voltage



5.2 Typical Characteristics

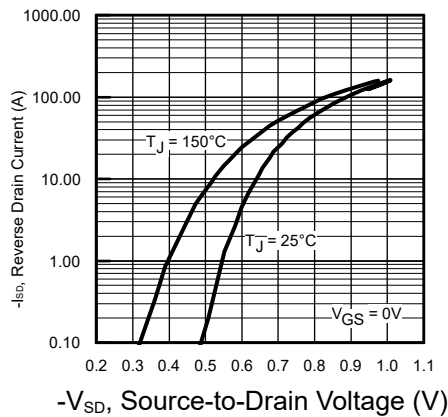


Fig 7. Typical Source-Drain Diode Forward Voltage

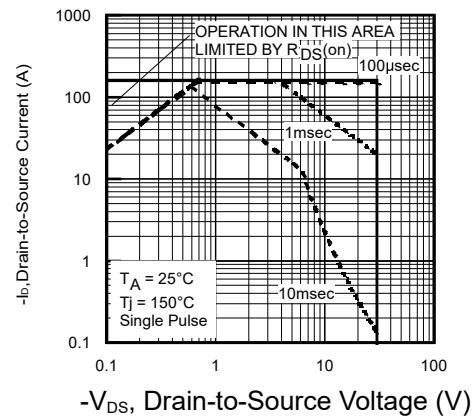


Fig 8. Maximum Safe Operating Area

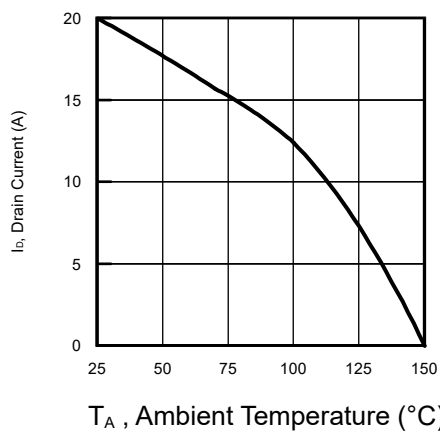


Fig 9. Maximum Drain Current vs. Ambient Temperature

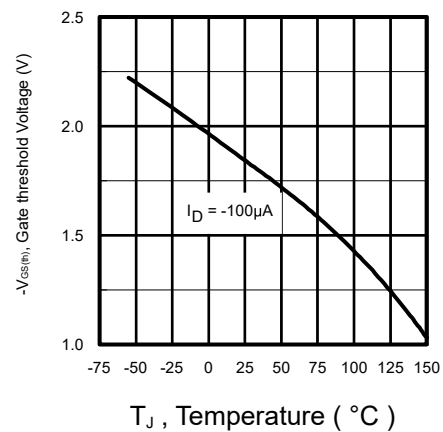


Fig 10. Threshold Voltage vs. Temperature

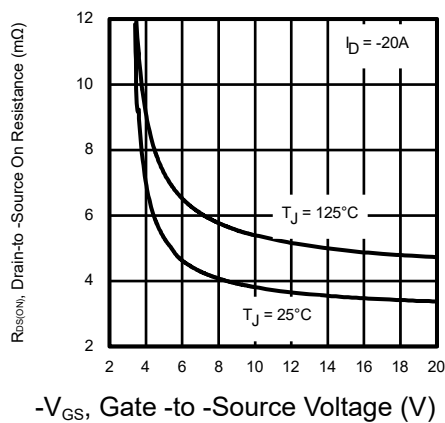


Fig 11. On-Resistance vs. Gate Voltage

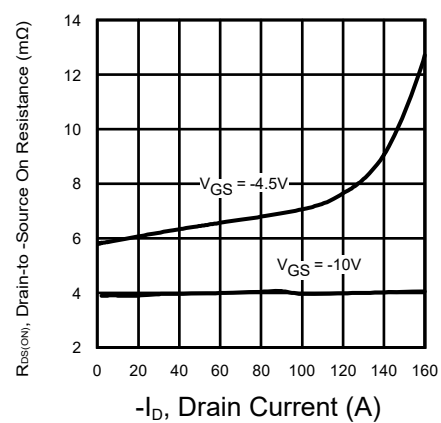
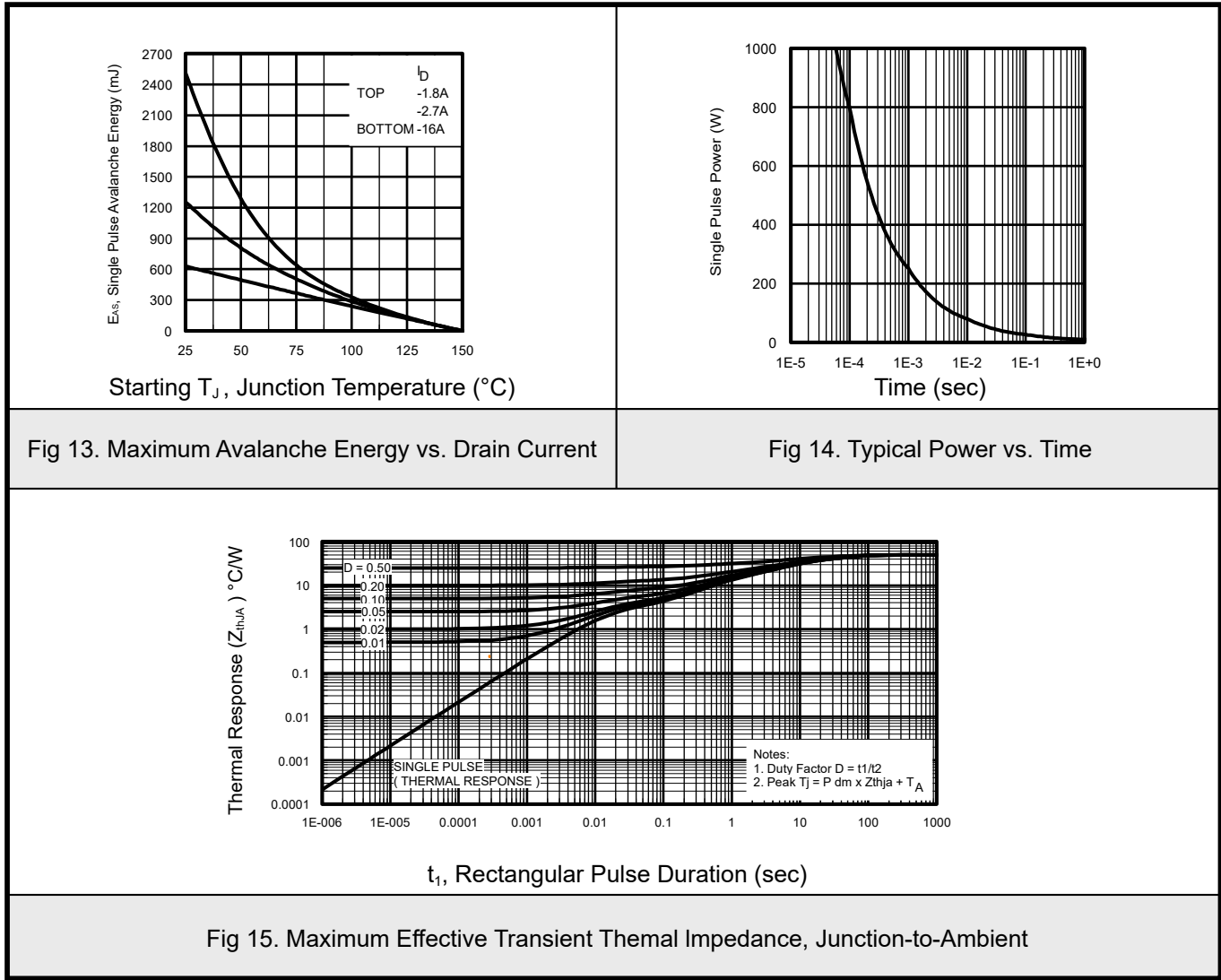


Fig 12. Typical On-Resistance vs. Drain Current



5.3Typical Characterisitics



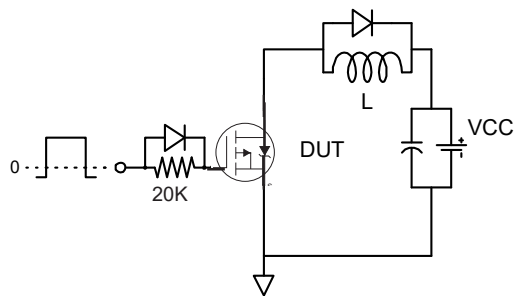


Fig 16a. Gate Charge Test Circuit

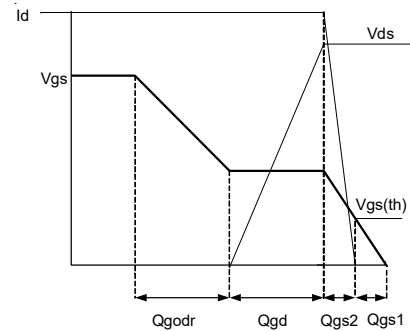


Fig 16b. Gate Charge Waveform

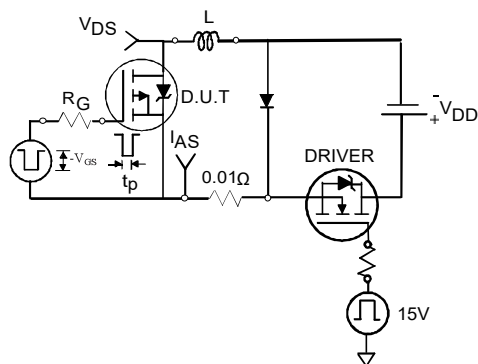


Fig 17a. Unclamped Inductive Test Circuit

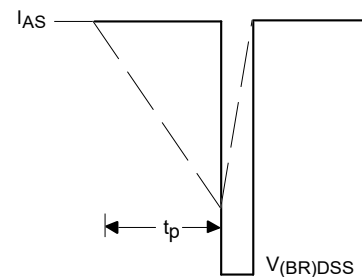


Fig 17b. Unclamped Inductive Waveforms

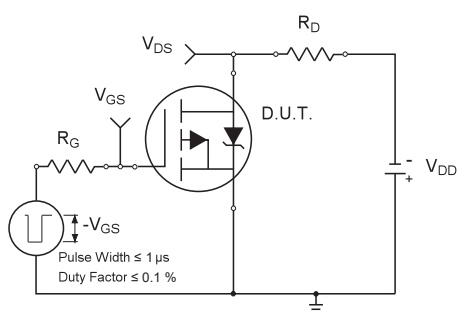


Fig 18a. Switching Time Test Circuit

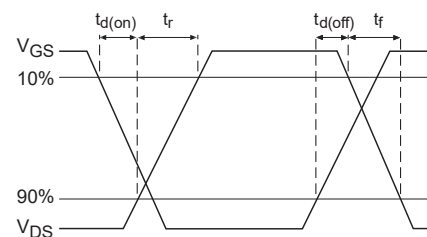
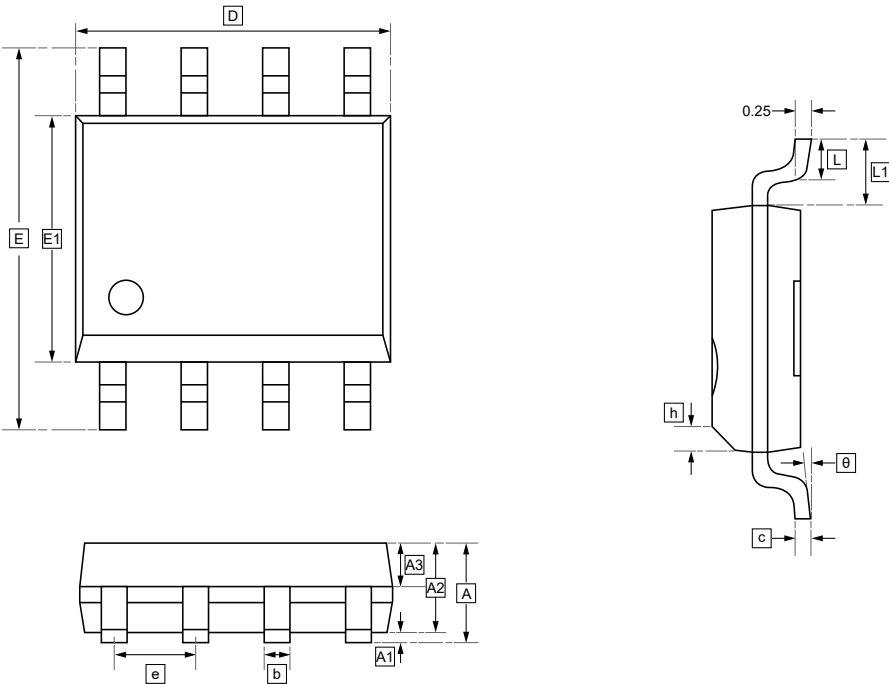


Fig 18b. Switching Time Waveforms



6.SOP-8 Package Outline Dimensions



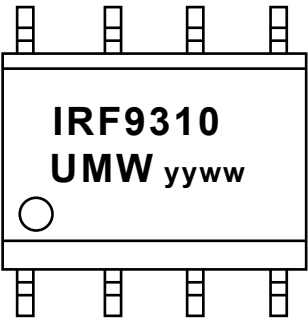
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.80	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.00	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°



7.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRF9310TR	SOP-8	3000	Tape and reel



8.Disclaimer

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