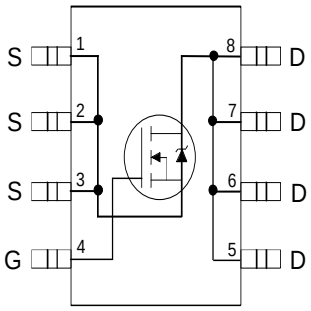
Applications

- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for

  Isolated DC-DC Converters in Networking Systems



Benefits

- Very Low $R_{DS(on)}$ at 4.5V V_{GS}
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current

- V_{DS}(V) = 30V
- I_D =17.2A (V_{GS}= 10V)
- $R_{DS(ON)}$ < 5.6mΩ (V_{GS} = 10V)
- $R_{DS(ON)}$ < 6.8mΩ (V_{GS} = 4.5V)

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	17.2	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	13.8	
I_{DM}	Pulsed Drain Current ①	135	
P_D @T_A = 25°C	Power Dissipation ④	2.5	W
P_D @T_A = 70°C	Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤		20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④⑤		50	

Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30			V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.024		V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		4.7	5.6	mΩ	V_{GS} = 10V, I_D = 17.2A ③
			5.8	6.8		V_{GS} = 4.5V, I_D = 13.8A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.5		2.2	V	V_{DS} = V_{GS}, I_D = 250μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient		- 5.4		mV/°C	
I_{DSS}	Drain-to-Source Leakage Current			1.0	μA	V_{DS} = 24V, V_{GS} = 0V
				150		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage			100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage			-100		V_{GS} = -20V
gfs	Forward Transconductance	73			S	V_{DS} = 15V, I_D = 13.3A
Q_g	Total Gate Charge		24	36		
Q_{gs1}	Pre-Vth Gate-to-Source Charge		6.2			V_{DS} = 15V
Q_{gs2}	Post-Vth Gate-to-Source Charge		2.0		nC	V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge		8.5			I_D = 13.3A
Q_{godr}	Gate Charge Overdrive		7.3			See Fig. 16
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})		10.5			
Q_{oss}	Output Charge		10		nC	V_{DS} = 10V, V_{GS} = 0V
$t_{d(on)}$	Turn-On Delay Time		13			V_{DD} = 15V, V_{GS} = 4.5V ③
t_r	Rise Time		8.9			I_D = 13.3A
$t_{d(off)}$	Turn-Off Delay Time		17		ns	Clamped Inductive Load
t_f	Fall Time		3.5			
C_{iss}	Input Capacitance		2910			V_{GS} = 0V
C_{oss}	Output Capacitance		600		pF	V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance		250			f = 1.0MHz

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②		48	mJ
I_{AR}	Avalanche Current ①		13.3	A

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)			3.1	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①			135		
V_{SD}	Diode Forward Voltage			1.0	V	T_J = 25°C, I_S = 13.3A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time		34	51	ns	T_J = 25°C, I_F = 13.3A, V_{DD} = 10V
Q_{rr}	Reverse Recovery Charge		21	32	nC	di/dt = 100A/μs ③

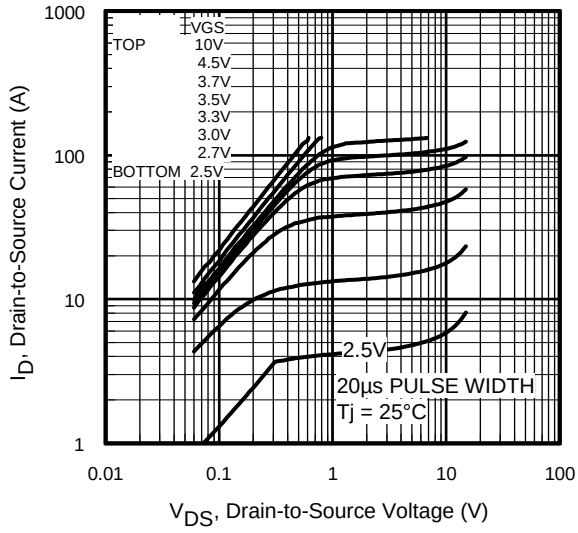


Fig 1. Typical Output Characteristics

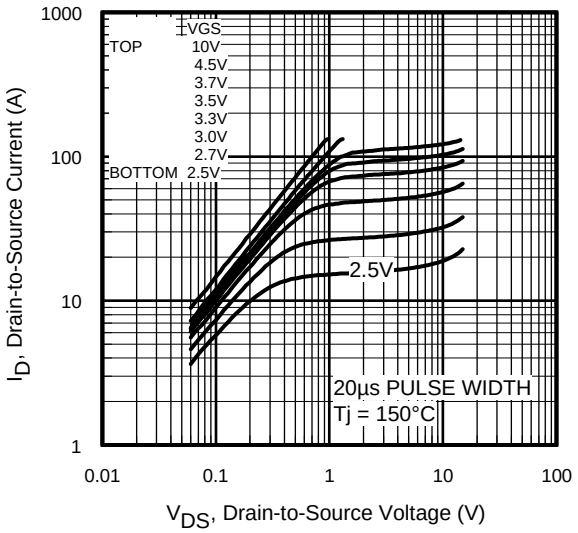


Fig 2. Typical Output Characteristics

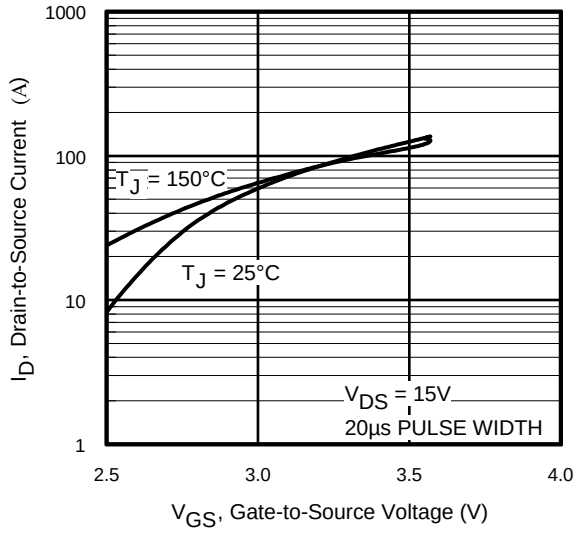


Fig 3. Typical Transfer Characteristics

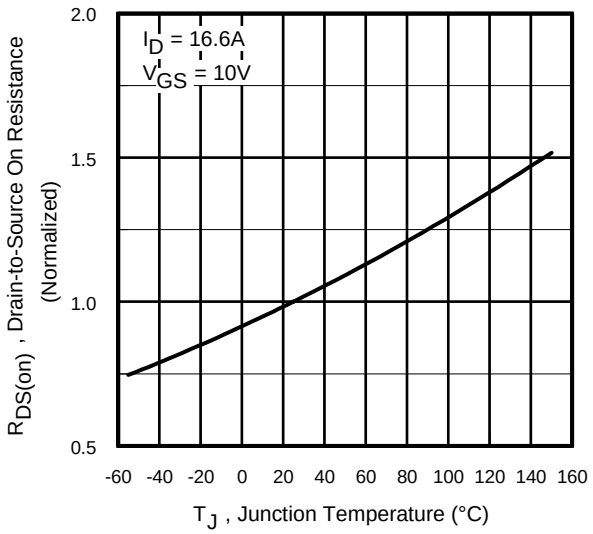


Fig 4. Normalized On-Resistance Vs. Temperature

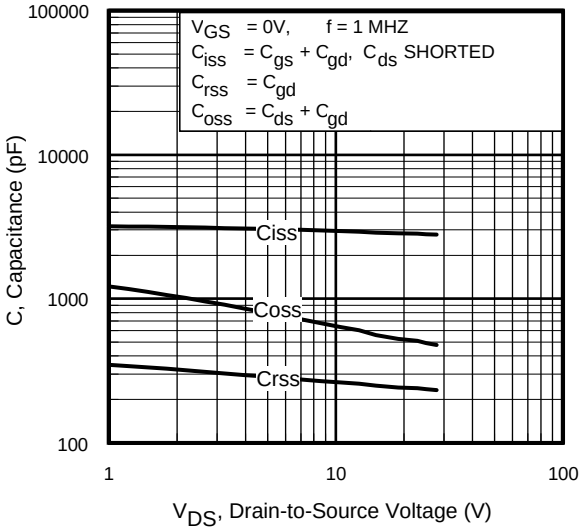


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

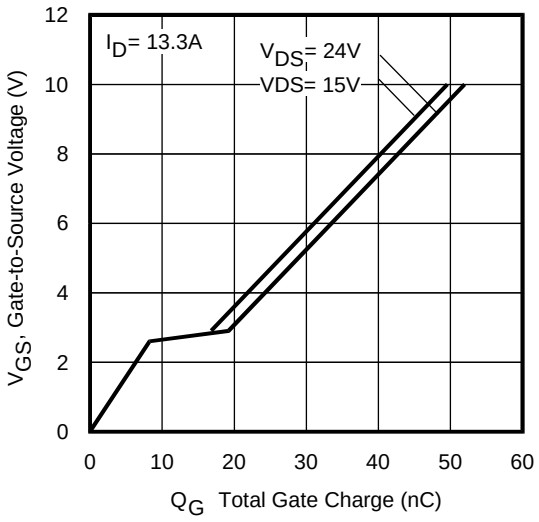


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

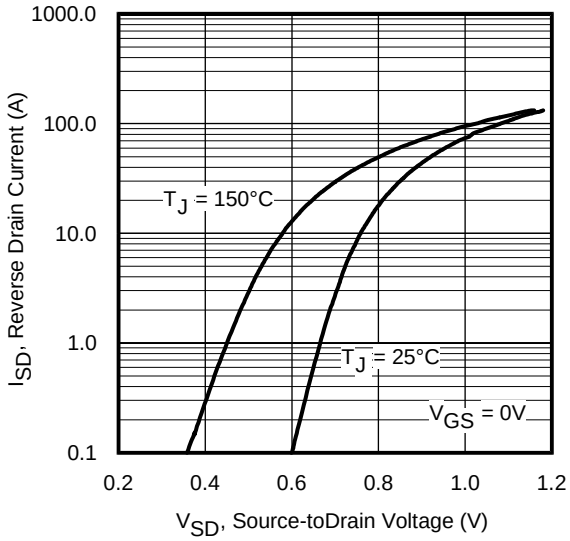


Fig 7. Typical Source-Drain Diode Forward Voltage

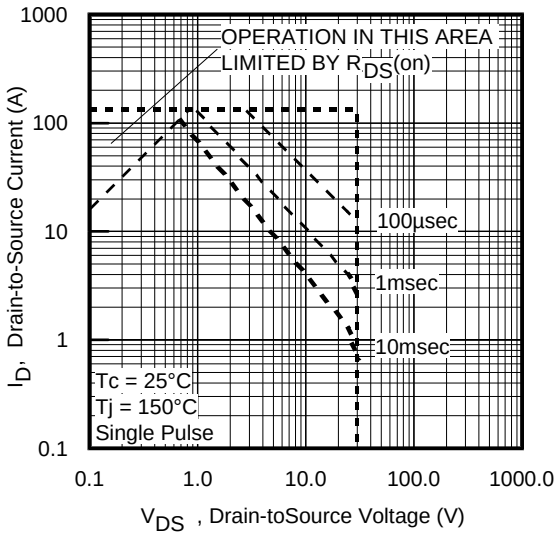


Fig 8. Maximum Safe Operating Area

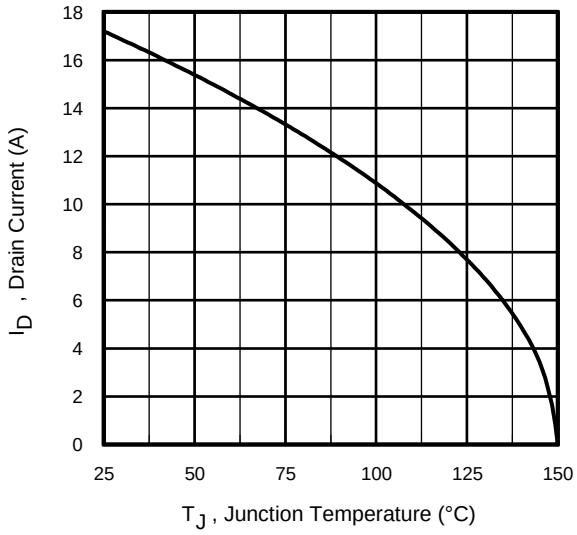


Fig 9. Maximum Drain Current Vs. Case Temperature

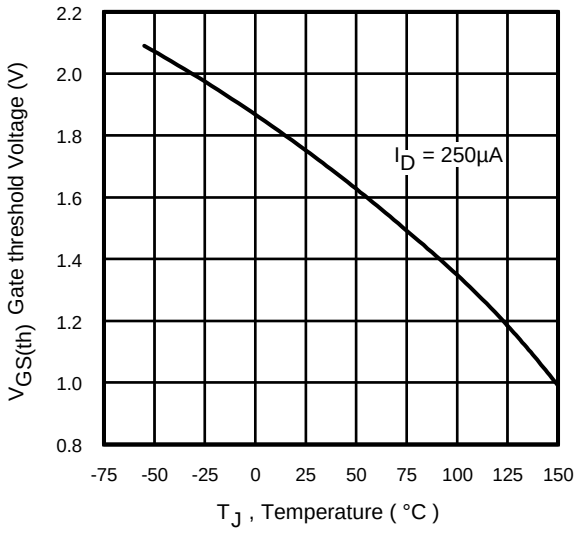


Fig 10. Threshold Voltage Vs. Temperature

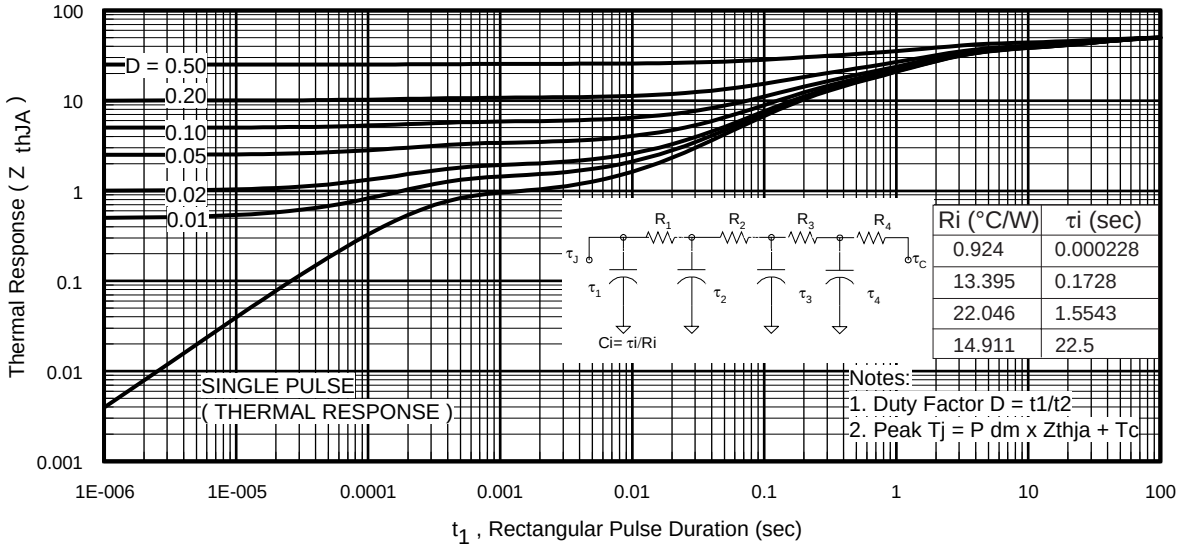


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

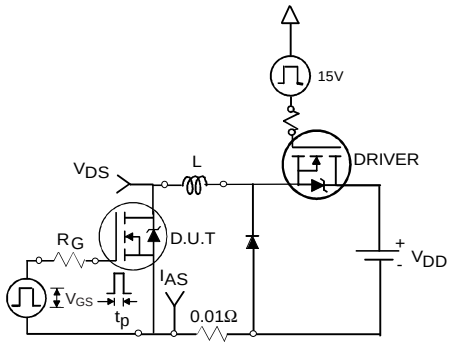


Fig 12a. Unclamped Inductive Test Circuit

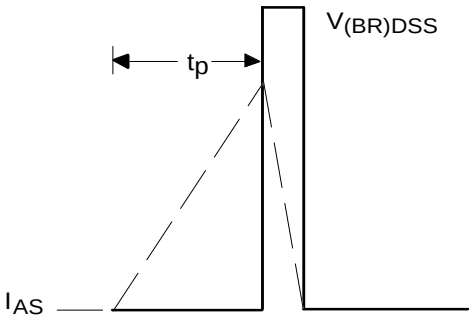


Fig 12b. Unclamped Inductive Waveforms

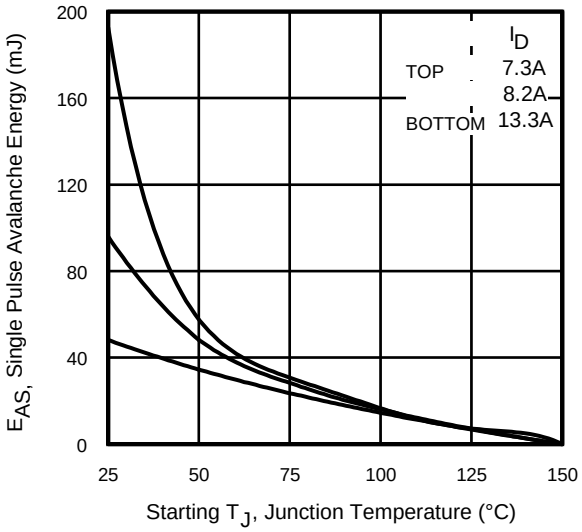


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

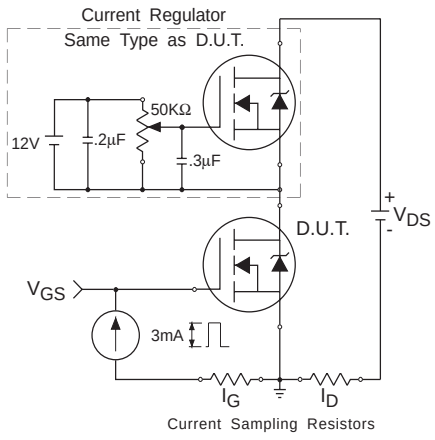


Fig 13. Gate Charge Test Circuit

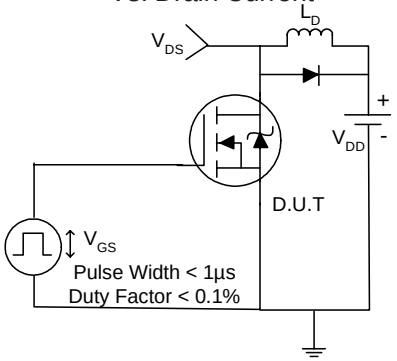


Fig 14a. Switching Time Test Circuit

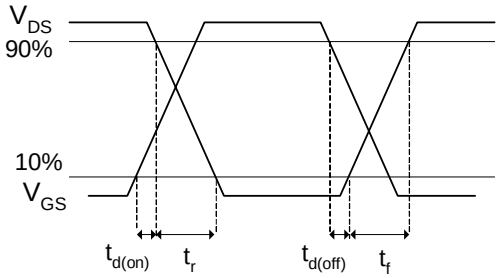
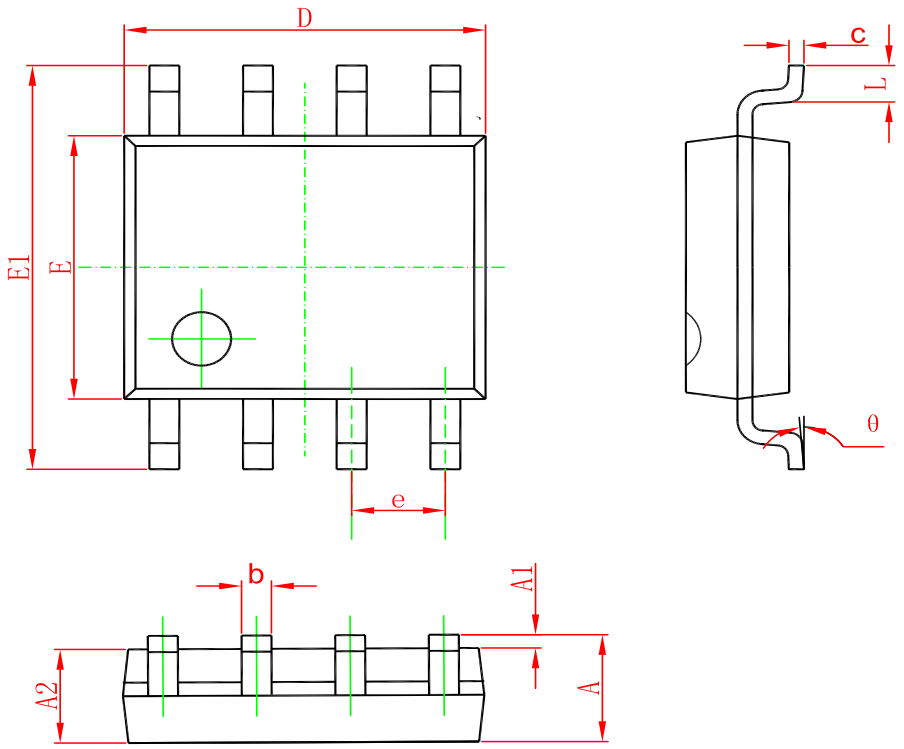


Fig 14b. Switching Time Waveforms

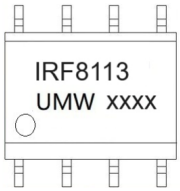
PACKAGE OUTLINE DIMENSIONS

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRF8113TR	SOP-8	3000	Tape and reel