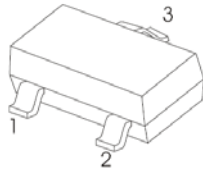
Features

- Industry-standard pinout
- Compatible with existing Surface Mount Techniques

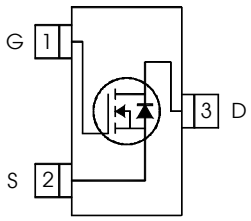
SOT－23



1. GATE
2. SOURCE
3. DRAIN

Benefits

- Lower switching losses
- Multi-vendor compatibility
- Easier manufacturing
- Environmentally friendly
- Increased reliability
- V_{DS}(V) =40V
- $R_{DS(ON)}$ <56mΩ (V_{GS} = 10V)
- $R_{DS(ON)}$ < 78mΩ (V_{GS} = 4.5V)



Application(s)

- Load/ System Switch
- DC Motor Drive

Absolute Maximum Ratings

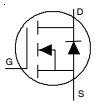
Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	40	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	3.6	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	2.9	
I_{DM}	Pulsed Drain Current	15	
P_D @T_A = 25°C	Maximum Power Dissipation	1.3	W
P_D @T_A = 70°C	Maximum Power Dissipation	0.8	
	Linear Derating Factor	0.01	W/°C
V_{GS}	Gate-to-Source Voltage	± 16	V
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient ③		100	°C/W
$R_{\theta JA}$	Junction-to-Ambient (t<10s) ④		99	

Electric Characteristics @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	40			V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.04		V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		40	50	mΩ	V_{GS} = 10V, I_D = 3.6A ②
			58	70		V_{GS} = 4.5V, I_D = 2.9A ②
$V_{GS(th)}$	Gate Threshold Voltage	1.0	1.8	2.5	V	V_{DS} = V_{GS}, I_D = 25μA
I_{DSS}	Drain-to-Source Leakage Current			20	μA	V_{DS} = 40V, V_{GS} = 0V
				250		V_{DS} = 40V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage			100	nA	V_{GS} = 16V
	Gate-to-Source Reverse Leakage			-100		V_{GS} = -16V
R_G	Internal Gate Resistance		1.1		Ω	
gfs	Forward Transconductance	6.2			S	V_{DS} = 10V, I_D = 3.6A
Q_g	Total Gate Charge		2.6	3.9	nC	I_D = 3.6A
Q_{gs}	Gate-to-Source Charge		0.7			V_{DS} = 20V
Q_{gd}	Gate-to-Drain ("Miller") Charge		1.4			V_{GS} = 4.5V ②
$t_{d(on)}$	Turn-On Delay Time		5.1		ns	V_{DD} = 20V
t_r	Rise Time		5.4			I_D = 1.0A
$t_{d(off)}$	Turn-Off Delay Time		6.4			R_G = 6.8 Ω
t_f	Fall Time		4.3			V_{GS} = 4.5V
C_{iss}	Input Capacitance		266		pF	V_{GS} = 0V
C_{oss}	Output Capacitance		49			V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance		29			f = 1.0MHz
I_S	Continuous Source Current (Body Diode)			1.3	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①			15		
V_{SD}	Diode Forward Voltage			1.2	V	T_J = 25°C, I_S = 1.3A, V_{GS} = 0V ②
t_{rr}	Reverse Recovery Time		10		ns	T_J = 25°C, V_R = 32V, I_F = 1.3 A
Q_{rr}	Reverse Recovery Charge		9.3		nC	di/dt = 100A/μs ②



Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Pulse width ≤ 400μs; duty cycle ≤ 2%.

③ Surface mounted on 1 in square Cu board

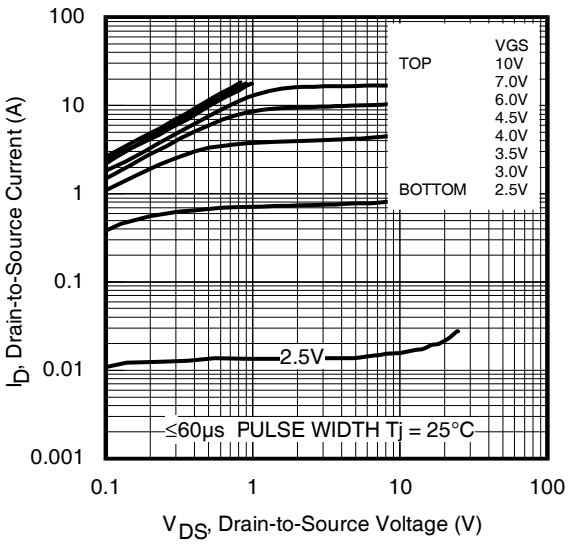


Fig 1. Typical Output Characteristics

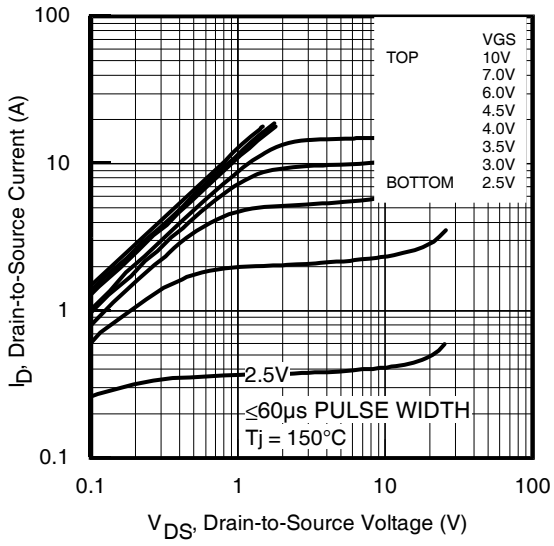


Fig 2. Typical Output Characteristics

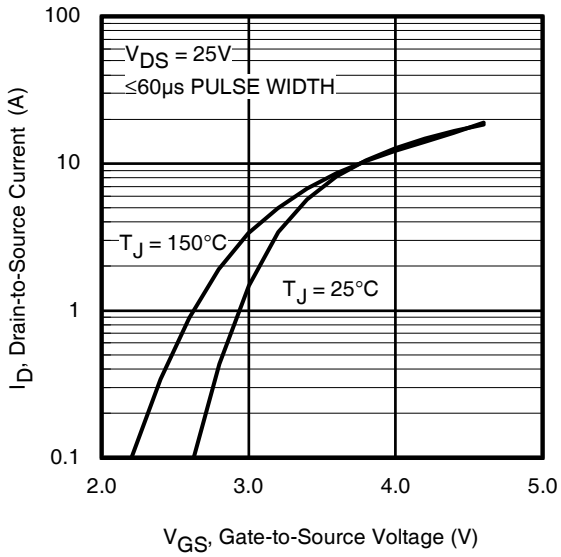


Fig 3. Typical Transfer Characteristics

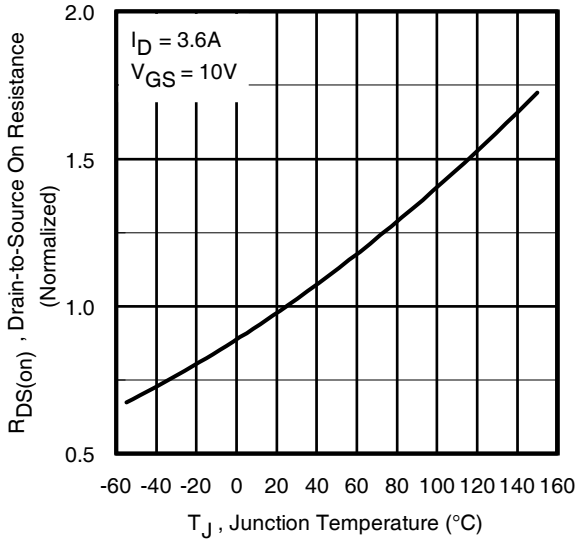


Fig 4. Normalized On-Resistance Vs. Temperature

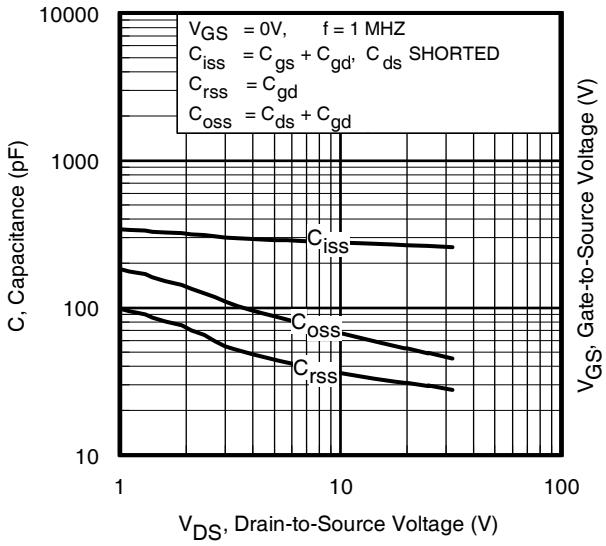


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

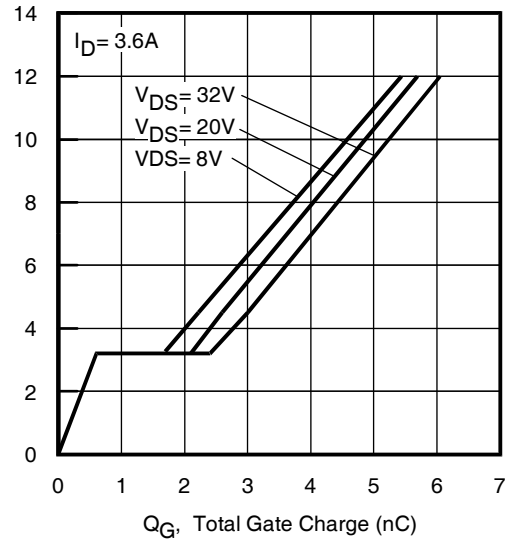


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

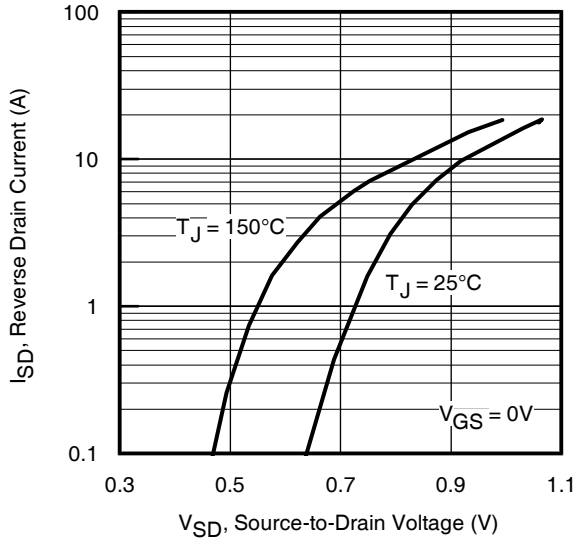


Fig 7. Typical Source-Drain Diode Forward Voltage

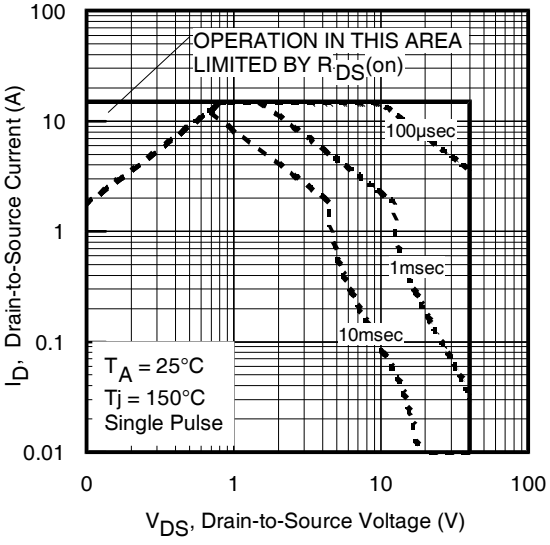


Fig 8. Maximum Safe Operating Area

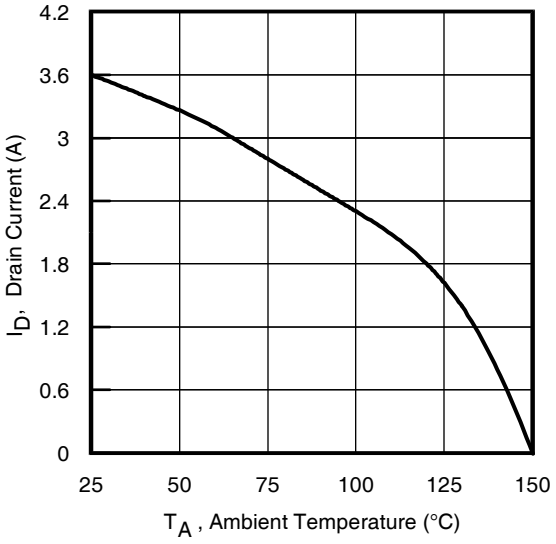


Fig 9. Maximum Drain Current Vs. Ambient Temperature

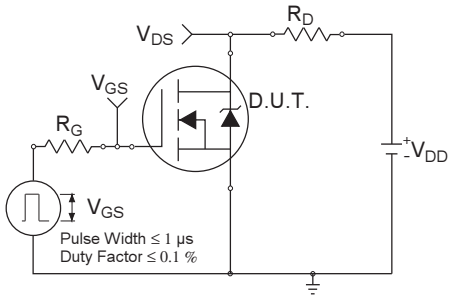


Fig 10a. Switching Time Test Circuit

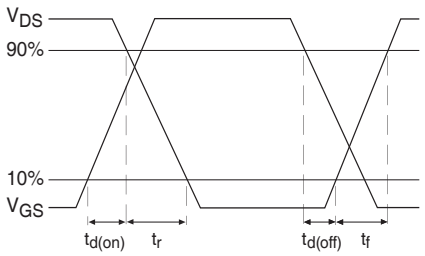


Fig 10b. Switching Time Waveforms

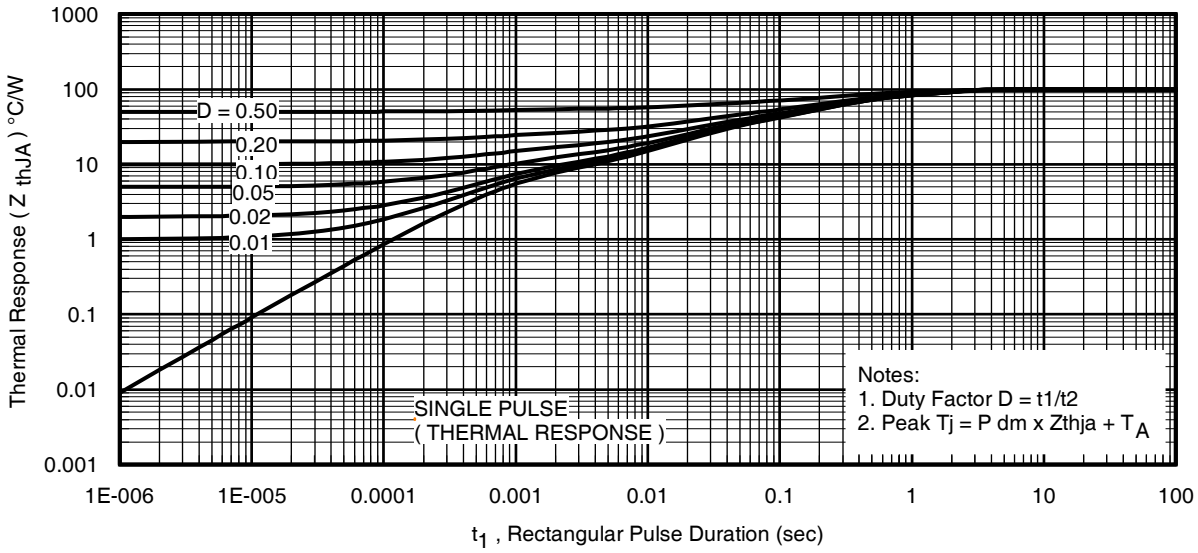


Fig 11. Typical Effective Transient Thermal Impedance, Junction-to-Ambient

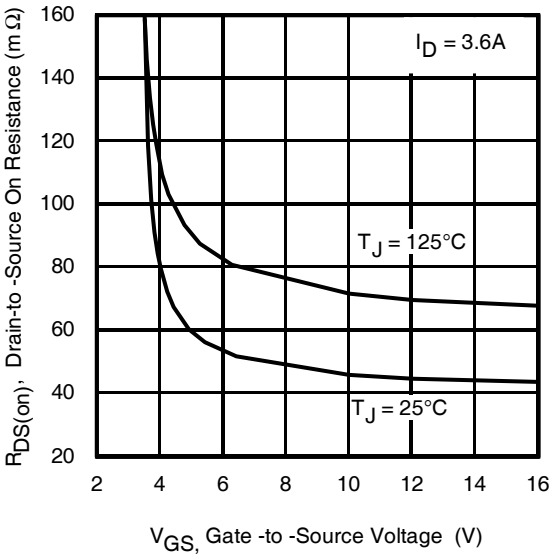


Fig 12. Typical On-Resistance Vs. Gate Voltage

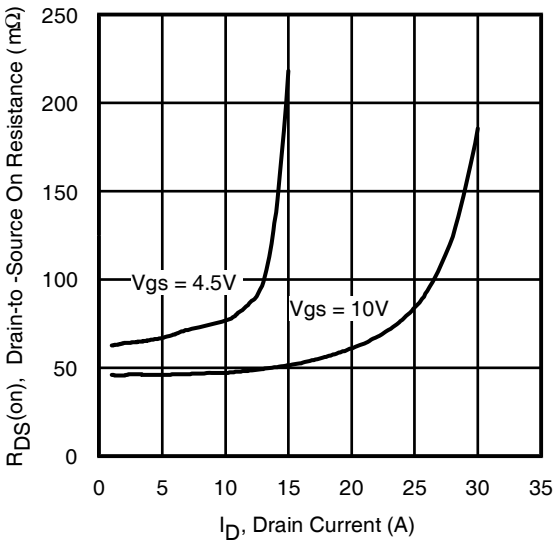


Fig 13. Typical On-Resistance Vs. Drain Current

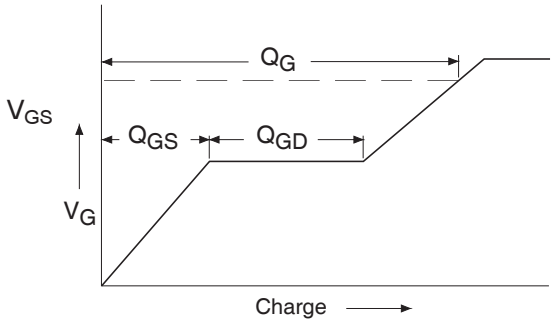


Fig 14a. Basic Gate Charge Waveform

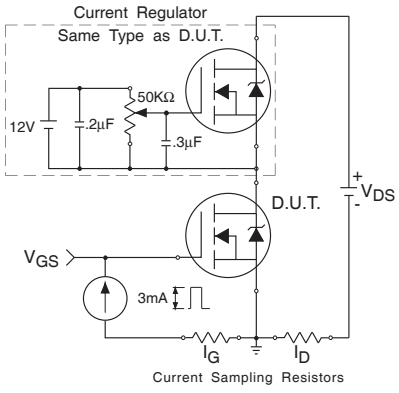


Fig 14b. Gate Charge Test Circuit

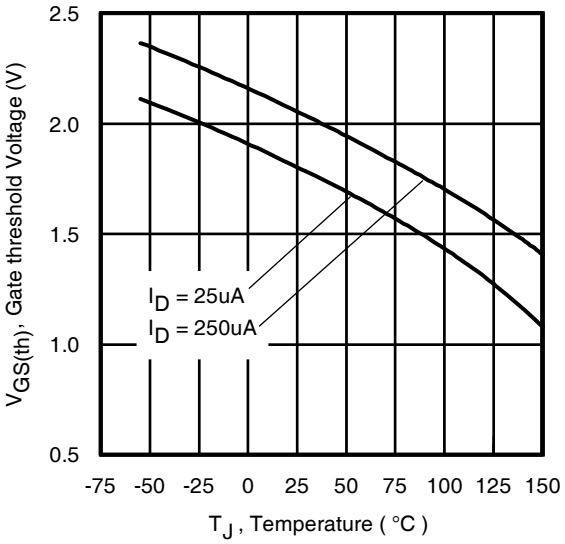


Fig 15. Typical Threshold Voltage Vs. Junction Temperature

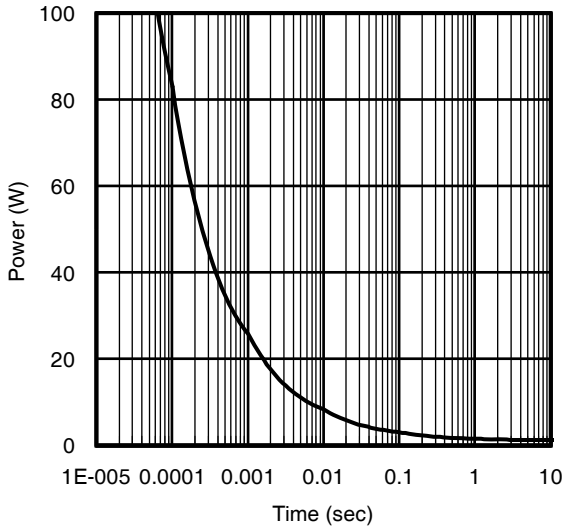
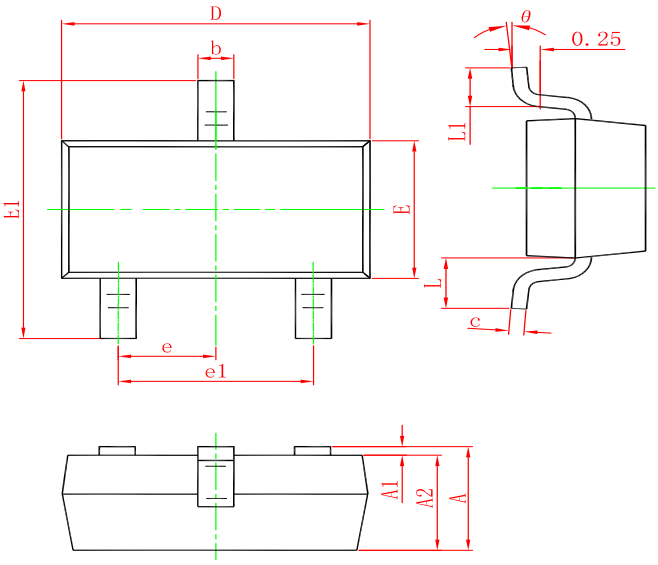


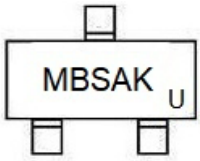
Fig 16. Typical Power Vs. Time

SOT-23 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRLML0040TR	SOT-23	3000	Tape and reel