## Features

● $V_{DS (V)}$ = 20V

● $R_{DS(ON)} <$ 46mΩ (V_{GS} = 4.5V)

● $R_{DS(ON)} <$ 66mΩ (V_{GS} = 2.5V)

Application(s)

● Load/ System Switch

Benefits

● Multi-vendor compatibility

● Environmentally friendly

● Increased Reliability

SOT－23
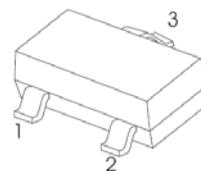
1. GATE
2. SOURCE
3. DRAIN
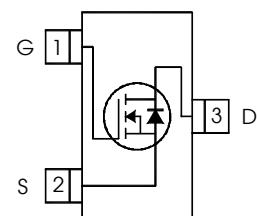
Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	20	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	4.1	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	3.3	
I_{DM}	Pulsed Drain Current	16	
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	± 12	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	

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

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	20		V		V = 0V, I = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.03		V/°C	Reference to 25°C, I = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		30	46	mΩ	V = 4.5V, I = 4.1A ②
			45	66		V = 2.5V, I = 3.3A ②
$V_{GS(th)}$	Gate Threshold Voltage	0.5	0.8	1.1	V	V = V , I = 5µA
I_{DSS}	Drain-to-Source Leakage Current			1.0	µA	V =16V, V = 0V
				10		V = 16V, V = 0V, T = 55°C
				150		V = 16V, V = 0V, T = 125°C
I_{GSS}	Gate-to-Source Forward Leakage			100	nA	V = 12V
	Gate-to-Source Reverse Leakage			-100		V = -12V
R_G	Internal Gate Resistance		4.0		Ω	
gfs	Forward Transconductance	10			S	V = 10V, I = 4.1A
Q_g	Total Gate Charge		3.5		nC	I = 4.1A
Q_{gs}	Gate-to-Source Charge		0.26			V =10V
Q_{gd}	Gate-to-Drain ("Miller") Charge		1.7			V = 4.5V ②
$t_{d(on)}$	Turn-On Delay Time		3.6		ns	V =10V②
t_r	Rise Time		4.9			I = 1.0A
$t_{d(off)}$	Turn-Off Delay Time		11			R = 6.8Ω
t_f	Fall Time		6.0			V = 4.5V
C_{iss}	Input Capacitance		290		pF	V = 0V
C_{oss}	Output Capacitance		64			V = 16V
C_{rss}	Reverse Transfer Capacitance		41			ƒ = 1.0MHz

Source - Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)			1.3	A	MOSFET symbol
I_{SM}	Pulsed Source Current (Body Diode) ①			16		integral reverse
V_{SD}	Diode Forward Voltage			1.2	V	T = 25°C, I = 4.1A, V = 0V ②
t_{rr}	Reverse Recovery Time		8.6	13	ns	T = 25°C, V = 15V, I =1.3A
Q_{rr}	Reverse Recovery Charge		2.8	4.2		di/dt = 100A/µs ②

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted
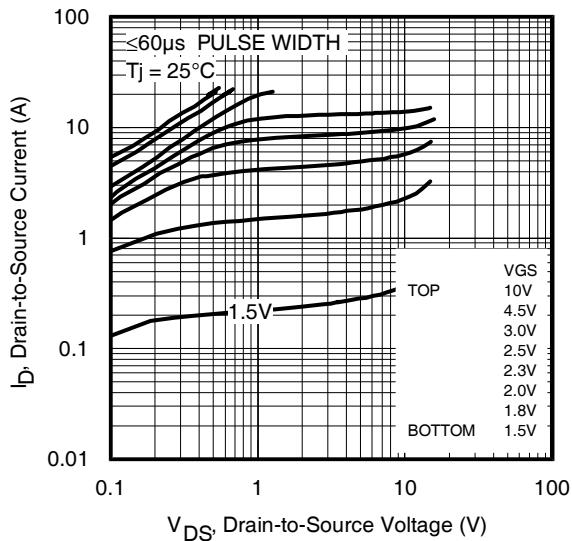

Fig 1. Typical Output Characteristics
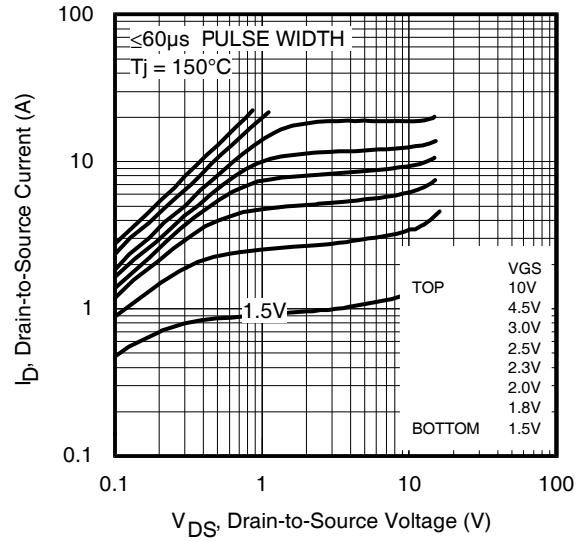
Fig 2. Typical Output Characteristics
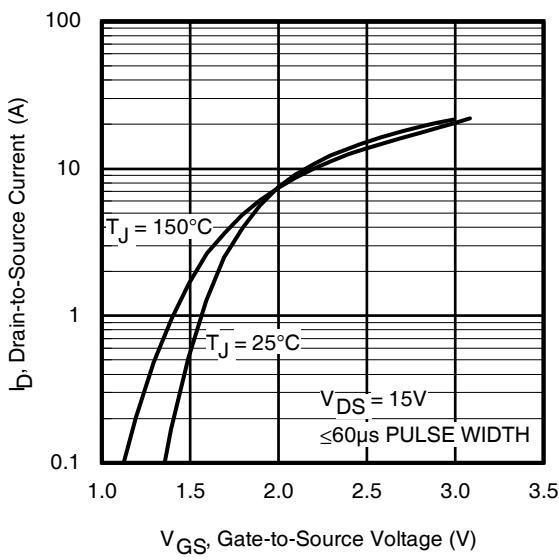
Fig 3. Typical Transfer Characteristics
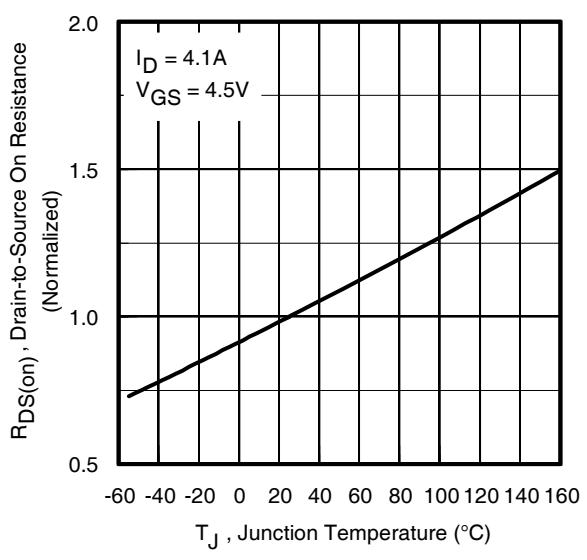
**Fig 4.** Normalized On-Resistance Vs. Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted
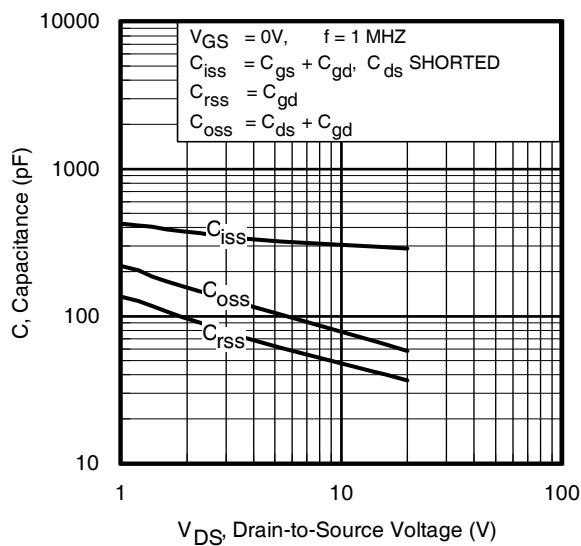
Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage
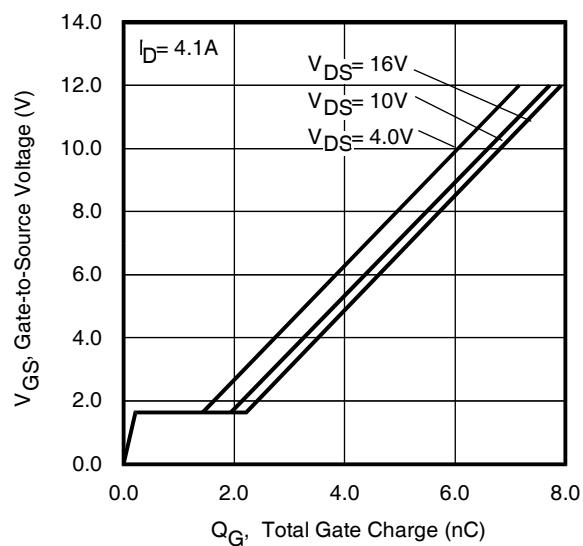
Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage
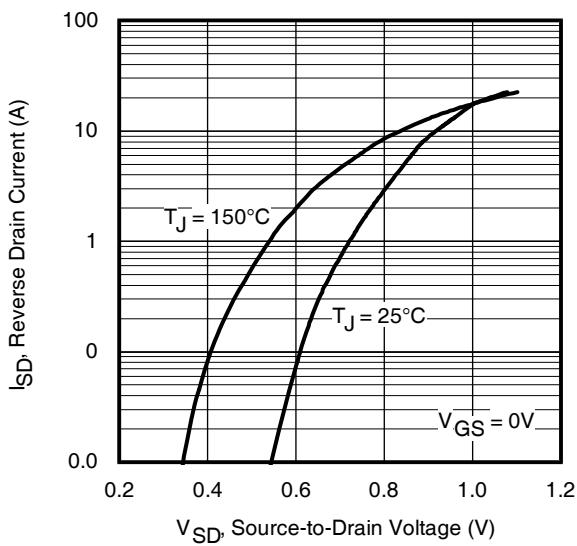
Fig 7. Typical Source-Drain Diode Forward Voltage
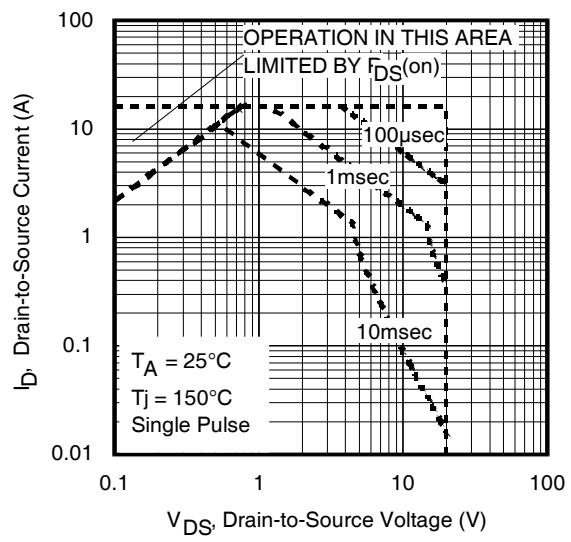
Fig 8. Maximum Safe Operating Area
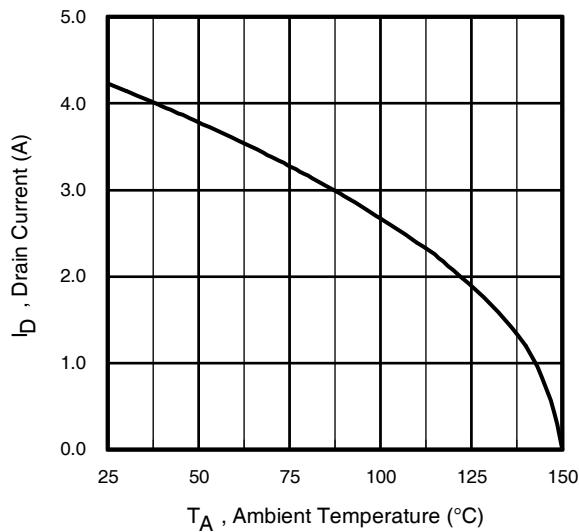
Fig 9. Maximum Drain Current Vs. Ambient Temperature
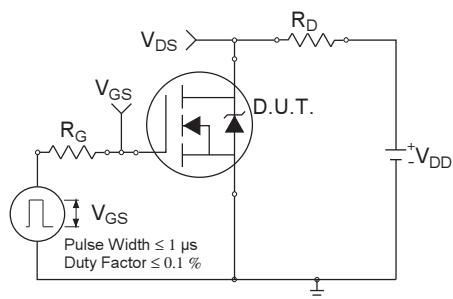
Fig 10a. Switching Time Test Circuit

Pulse Width ≤ 1 μs
Duty Factor ≤ 0.1 %
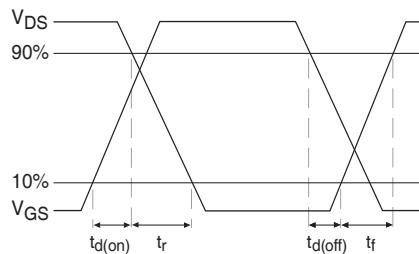
Fig 10b. Switching Time Waveforms

Notes:
1. Duty Factor D = t1/t2
2. Peak Tj = P dm x Zthjc + Tc
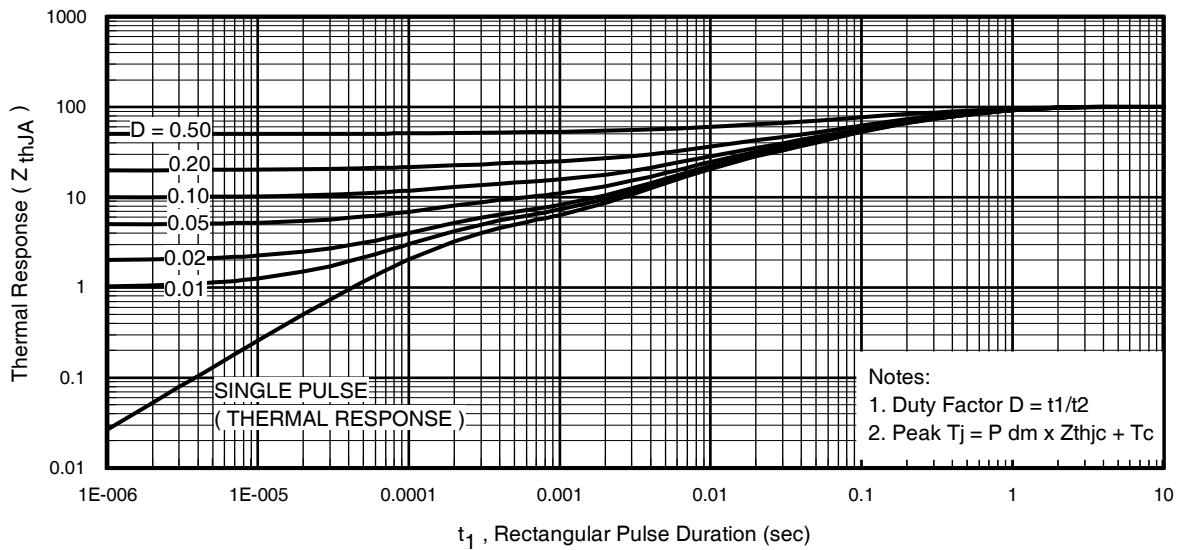
**Fig 11.** Typical Effective Transient Thermal Impedance, Junction-to-Ambient
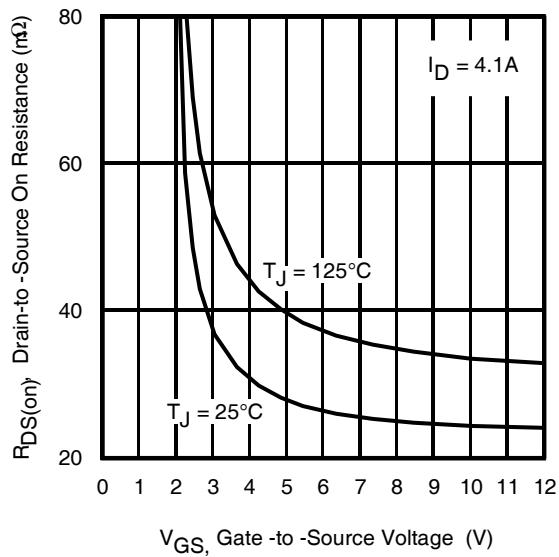
**Fig 12.** Typical On-Resistance Vs. Gate Voltage
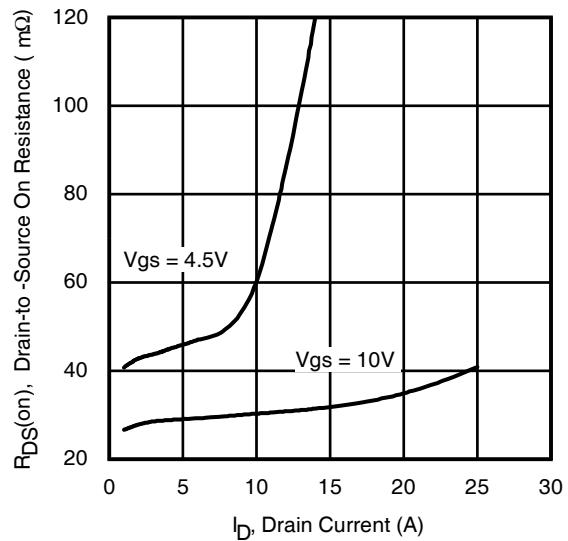


Fig 13. Typical On-Resistance Vs. Drain Current
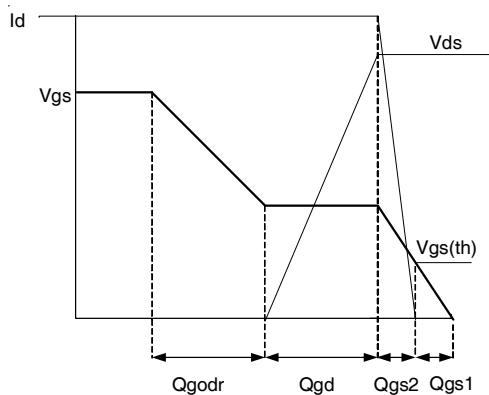
**Fig 14a.** Basic Gate Charge Waveform
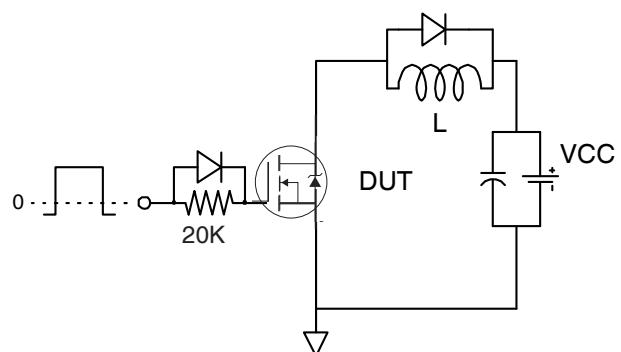
**Fig 14b.** Gate Charge Test Circuit
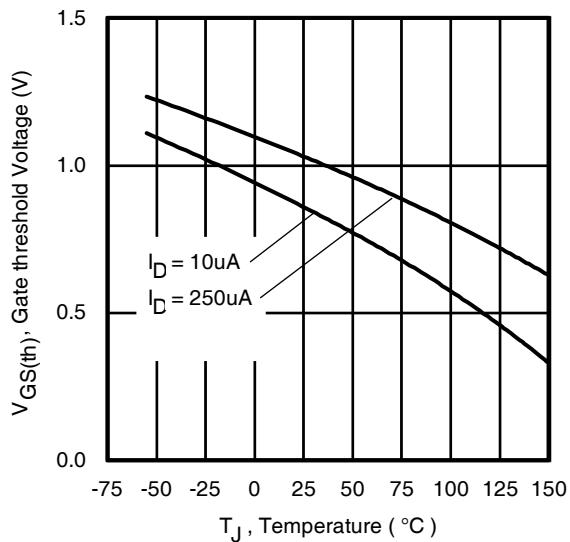
**Fig 15.** Typical Threshold Voltage Vs. Junction Temperature
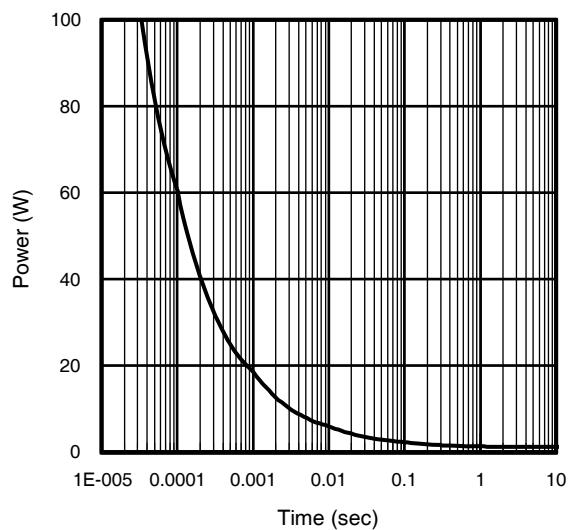
**Fig 16.** Typical Power Vs. Time

SOT-23 PACKAGE OUTLINE DIMENSIONS
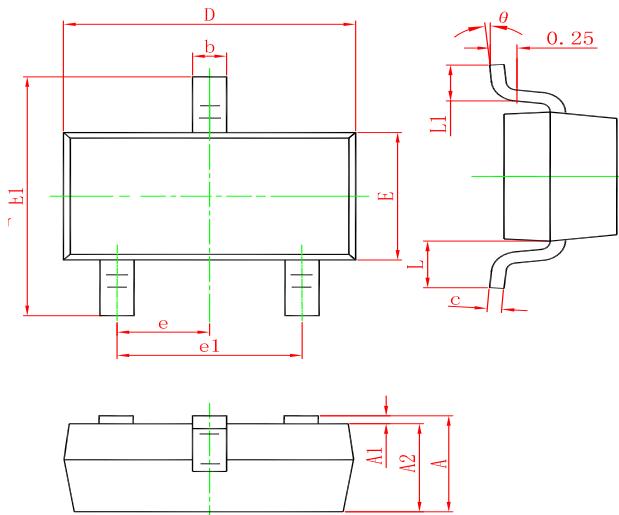
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		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

TBVC8 U
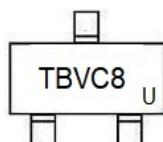
Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRLML6246TR	SOT-23	3000	Tape and reel