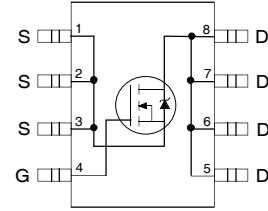


**Application**

- Generation V Technology
- Ultra Low On-Resistance
- N-Channel Mosfet
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching
- 100% Rg Tested
- Lead-Free



Top View

**Features**

- $V_{DS} (V) = 30V$
- $R_{DS(ON)} < 12m\Omega$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 17m\Omega$  ( $V_{GS} = 4.5V$ )

**Absolute Maximum Ratings**

Symbol	Parameter	Max	Units
$V_{DS}$	Drain-to-Source Voltage	30	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	13	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	9.2	
$I_{DM}$	Pulsed Drain Current ①	58	
$P_D @ T_A = 25^\circ C$	Power Dissipation	2.5	W
	Linear Derating Factor	0.02	mW/°C
$E_{AS}$	Single Pulse Avalanche Energy ②	260	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to +150	°C

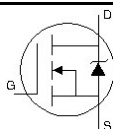
**Thermal Resistance Ratings**

Symbol	Parameter	Typ	Max	Units
$R_{\theta JL}$	Junction-to-Drain Lead	—	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④	—	50	

**Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Symbol	Parameter	Min	Typ	Max	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.034	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	—	12	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 7.3A ④
		—	—	17		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.7A ④
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.0	—	3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
g <sub>fs</sub>	Forward Transconductance	10	—	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 3.7A
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	12	μA	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V
		—	—	25		V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	-100	nA	V <sub>GS</sub> = -20V
	Gate-to-Source Reverse Leakage	—	—	100		V <sub>GS</sub> = 20V
Q <sub>g</sub>	Total Gate Charge	—	52	79	nC	I <sub>D</sub> = 7.3A
Q <sub>gs</sub>	Gate-to-Source Charge	—	6.1	9.2		V <sub>DS</sub> = 24V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	16	23		V <sub>GS</sub> = 10V, See Fig. 6 and 9 ④
R <sub>G</sub>	Gate Resistance	—	—	3.7	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	8.6	—	ns	V <sub>DD</sub> = 15V
t <sub>r</sub>	Rise Time	—	50	—		I <sub>D</sub> = 7.3A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	52	—		R <sub>G</sub> = 6.2 Ω
t <sub>f</sub>	Fall Time	—	46	—		R <sub>G</sub> = 2.0Ω, See Fig. 10 ④
C <sub>iss</sub>	Input Capacitance	—	1800	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	680	—		V <sub>DS</sub> = 25V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	240	—		f = 1.0MHz, See Fig. 5

**Source-Drain Ratings and Characteristics**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	58		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.0	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 7.3A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	74	110	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 7.3A
Q <sub>rr</sub>	Reverse Recovery Charge	—	200	300	nC	di/dt = 100A/μs ③

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② Starting T<sub>J</sub> = 25°C, L = 9.8mH  
R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 7.3A. (See Figure 12)
- ③ I<sub>SD</sub> ≤ 7.3A, di/dt ≤ 100A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 150°C
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ⑤ Surface mounted on FR-4 board
- ⑥ R<sub>θ</sub> is measured at T<sub>J</sub> approximately 90°C

Typical Characteristics

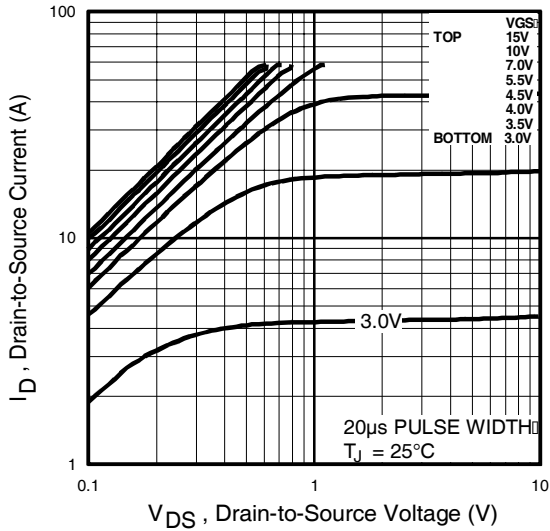


Fig 1. Typical Output Characteristics

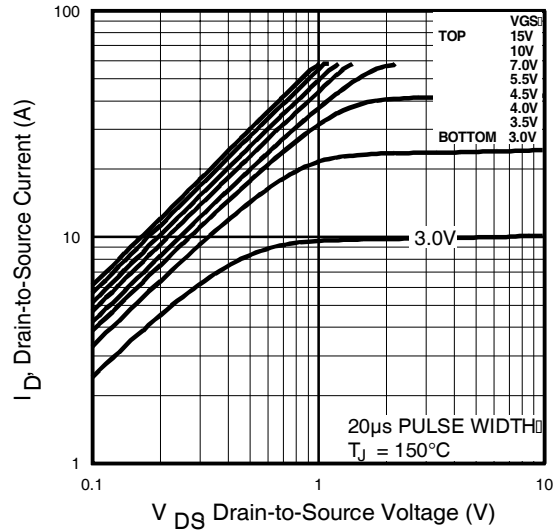


Fig 2. Typical Output Characteristics

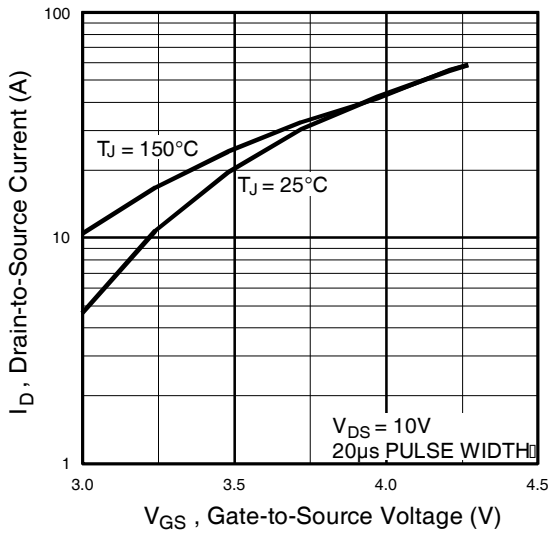


Fig 3. Typical Transfer Characteristics

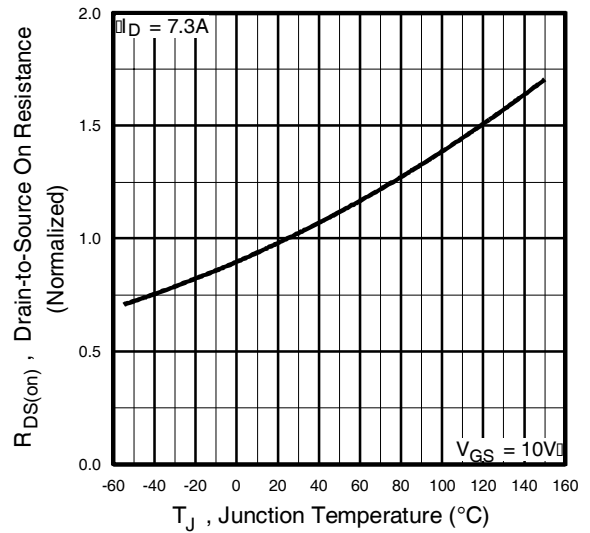


Fig 4. Normalized On-Resistance Vs. Temperature

Typical Characteristics

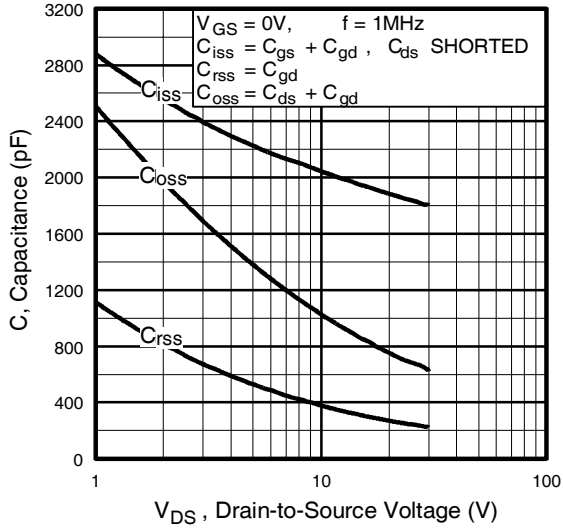


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

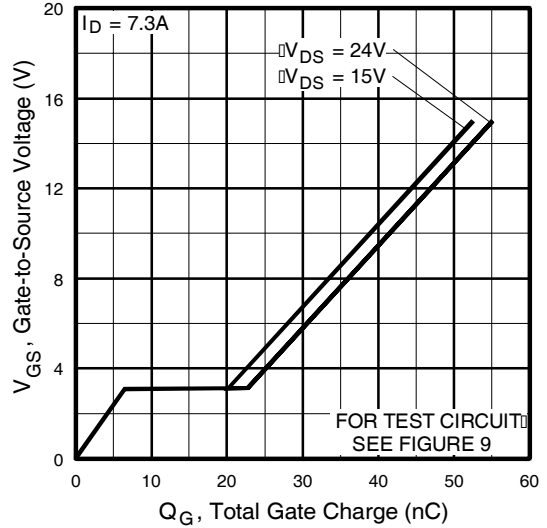


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

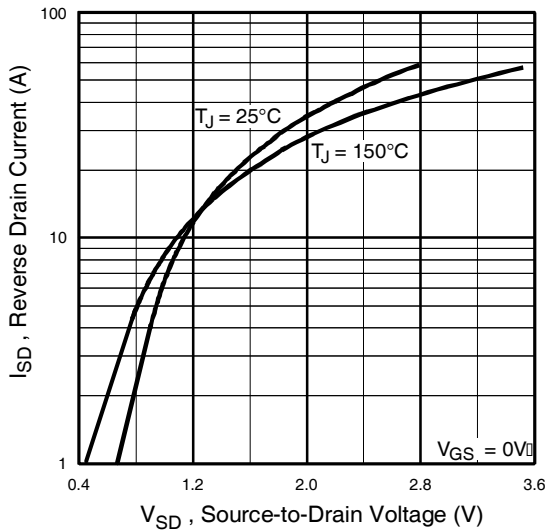


Fig 7. Typical Source-Drain Diode Forward Voltage

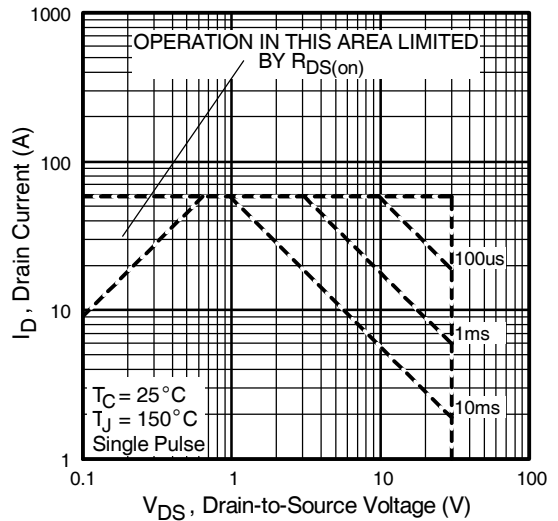


Fig 8. Maximum Safe Operating Area

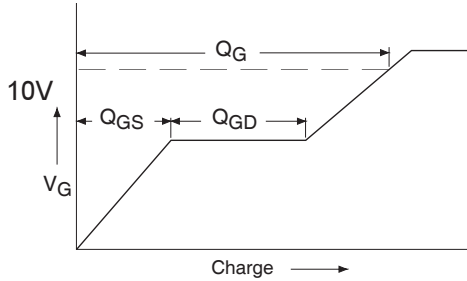


Fig 9a. Basic Gate Charge Waveform

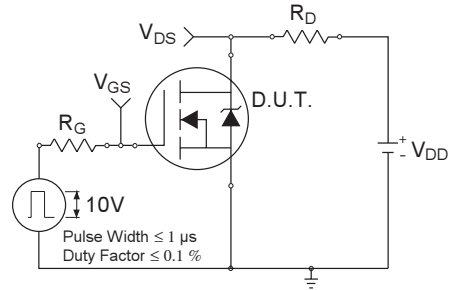


Fig 10a. Switching Time Test Circuit

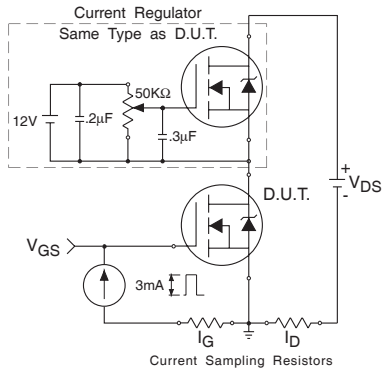


Fig 9b. Gate Charge Test Circuit

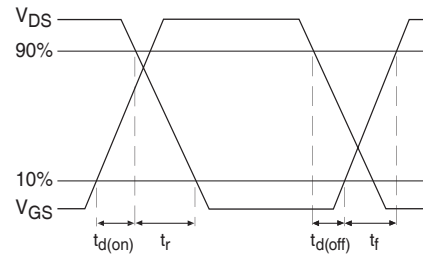


Fig 10b. Switching Time Waveforms

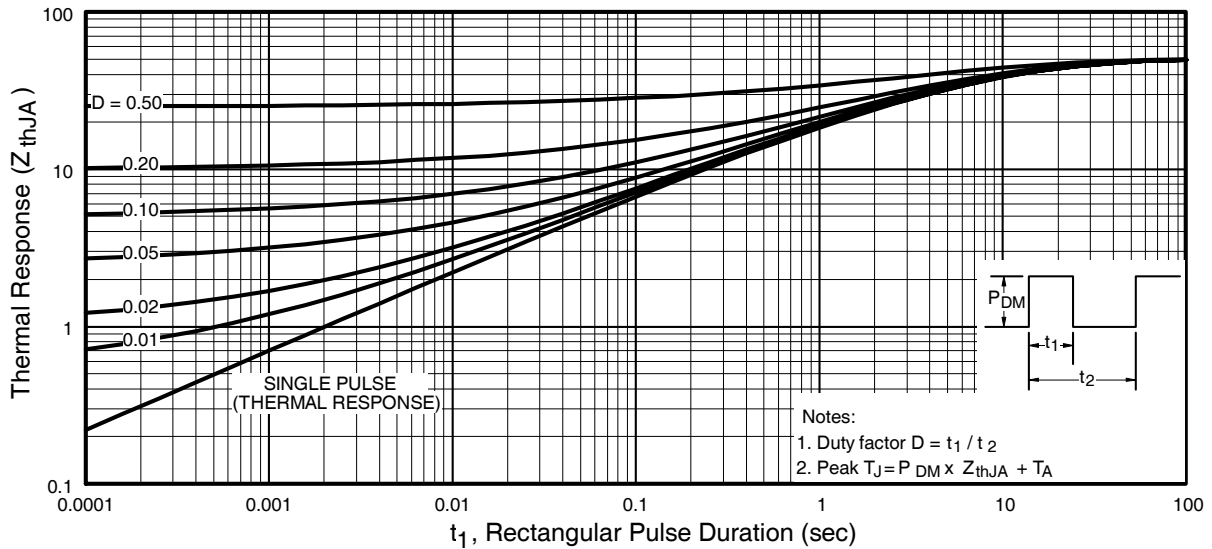


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

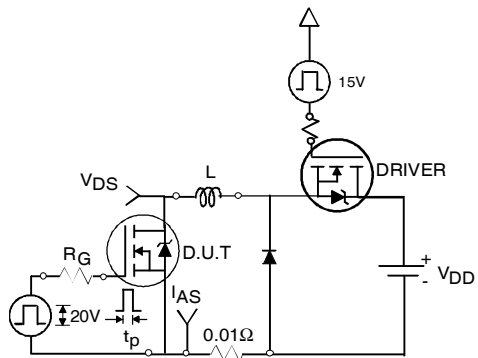


Fig 12a. Unclamped Inductive Test Circuit

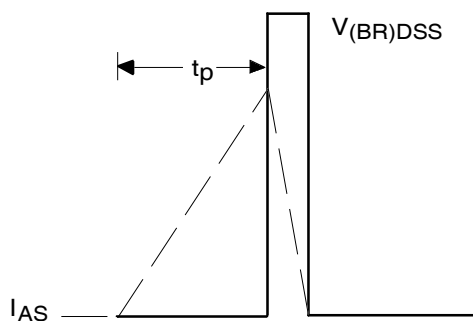


Fig 12b. Unclamped Inductive Waveforms

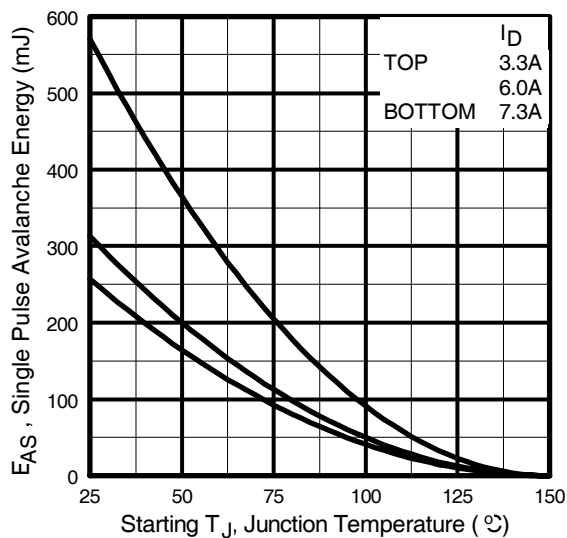
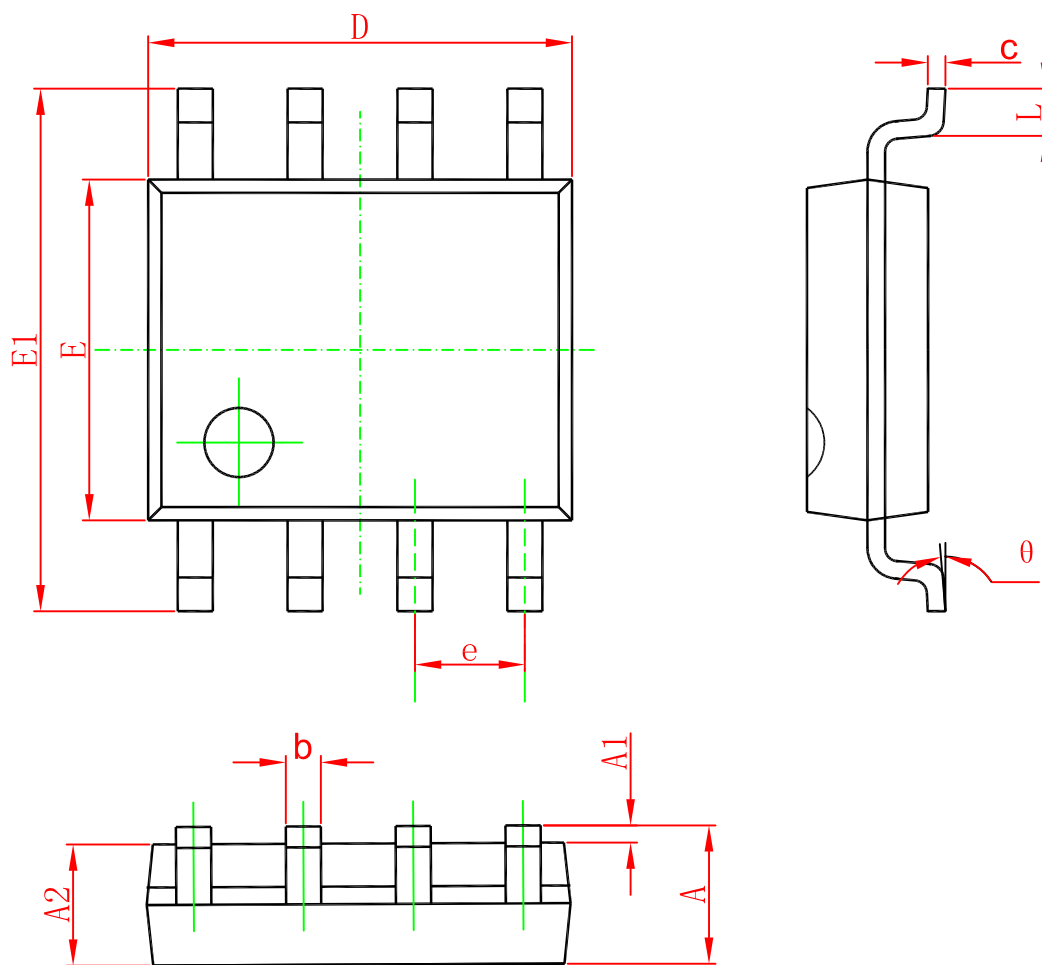


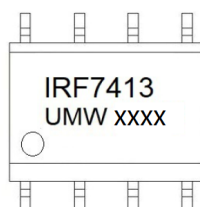
Fig 12c. Maximum Avalanche Energy Vs. Drain Current

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
$\theta$	0°	8°	0°	8°

## Marking



## Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRF7413TR	SOP-8	3000	Tape and reel