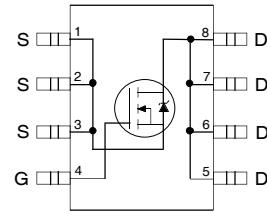


Application

- Generation VTechnology
- 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	± 20	
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	13	
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	9.2	A
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/ $^\circ C$
E_{AS}	Single Pulse Avalanche Emergency 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	$^\circ C$

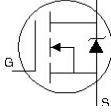
Thermal Resistance Ratings

Symbol	Parameter	Typ	Max	Units
R_{0JL}	Junction-to-Drain Lead	—	20	$^\circ C/W$
R_{0JA}	Junction-to-Ambient ④	—	50	

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$V_{(\text{BR})\text{DSS}}$	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu\text{A}$
$\Delta V_{(\text{BR})\text{DSS}}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.034	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(\text{on})}$	Static Drain-to-Source On-Resistance	—	—	12	$\text{m}\Omega$	$V_{GS} = 10V, I_D = 7.3\text{A}$ ④
		—	—	17		$V_{GS} = 4.5V, I_D = 3.7\text{A}$ ④
$V_{GS(\text{th})}$	Gate Threshold Voltage	1.0	—	3.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
g_{fs}	Forward Transconductance	10	—	—	S	$V_{DS} = 10V, I_D = 3.7\text{A}$
I_{DSS}	Drain-to-Source Leakage Current	—	—	12	μA	$V_{DS} = 30V, V_{GS} = 0V$
		—	—	25		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 20V$
Q_g	Total Gate Charge	—	52	79	nC	$I_D = 7.3\text{A}$
Q_{gs}	Gate-to-Source Charge	—	6.1	9.2		$V_{DS} = 24V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	16	23		$V_{GS} = 10V$, See Fig. 6 and 9 ④
R_G	Gate Resistance	—	—	3.7	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	8.6	—	ns	$V_{DD} = 15V$
t_r	Rise Time	—	50	—		$I_D = 7.3\text{A}$
$t_{d(off)}$	Turn-Off Delay Time	—	52	—		$R_G = 6.2 \Omega$
t_f	Fall Time	—	46	—		$R_G = 2.0\Omega$, See Fig. 10 ④
C_{iss}	Input Capacitance	—	1800	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	680	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	240	—		$f = 1.0\text{MHz}$, See Fig. 5

Source-Drain Ratings and Characteristics

Symbol	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	—	—	58		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 7.3\text{A}, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	74	110	ns	$T_J = 25^\circ\text{C}, I_F = 7.3\text{A}$
Q_{rr}	Reverse Recovery Charge	—	200	300	nC	$dI/dt = 100\text{A}/\mu\text{s}$ ③

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② Starting $T_J = 25^\circ\text{C}$, $L = 9.8\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 7.3\text{A}$. (See Figure 12)
- ③ $I_{SD} \leq 7.3\text{A}$, $di/dt \leq 100\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(\text{BR})\text{DSS}}$,
 $T_J \leq 150^\circ\text{C}$
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ⑤ Surface mounted on FR-4 board
- ⑥ R_0 is measured at T_J approximately 90°C

Typical Characteristics

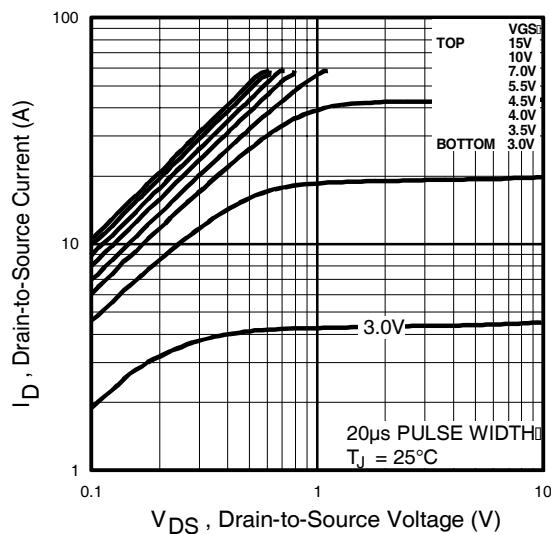


Fig 1. Typical Output Characteristics

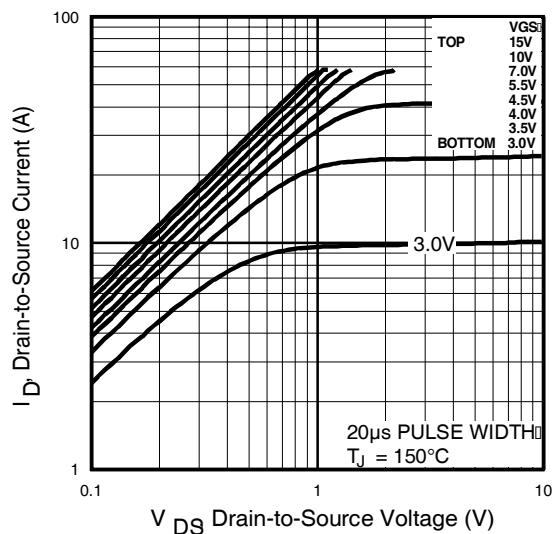


Fig 2. Typical Output Characteristics

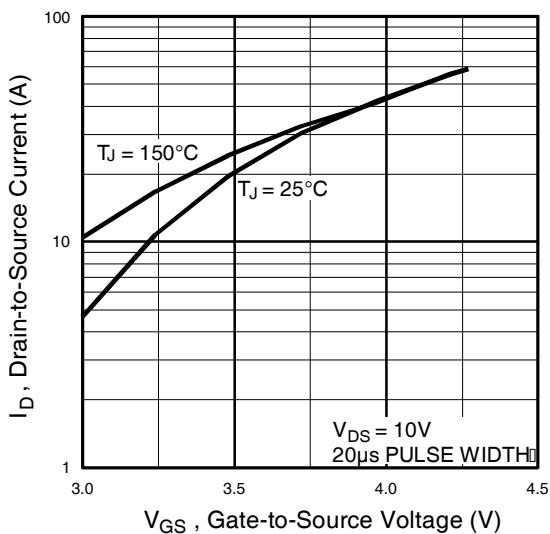


Fig 3. Typical Transfer Characteristics

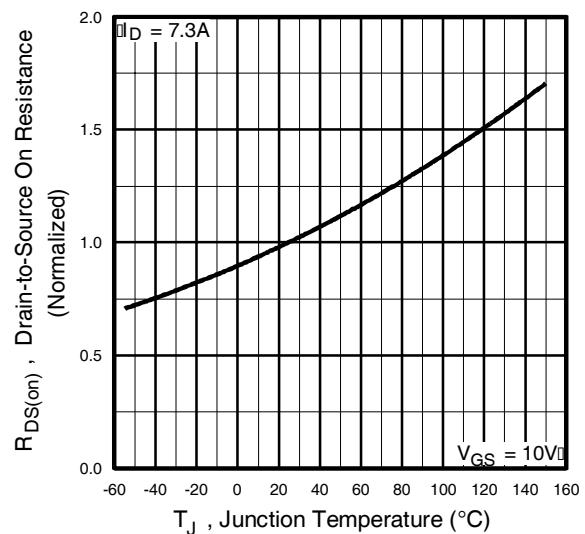


Fig 4. Normalized On-Resistance
Vs. Temperature

Typical Characteristics

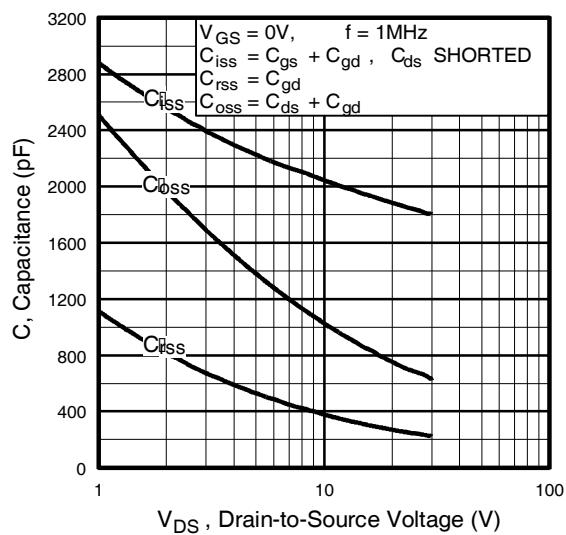


Fig 5. Typical Capacitance Vs.
Drain-to-Source Voltage

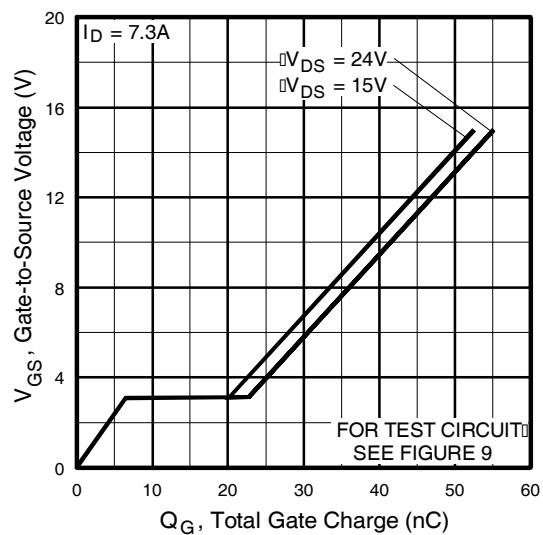


Fig 6. Typical Gate Charge Vs.
Gate-to-Source Voltage

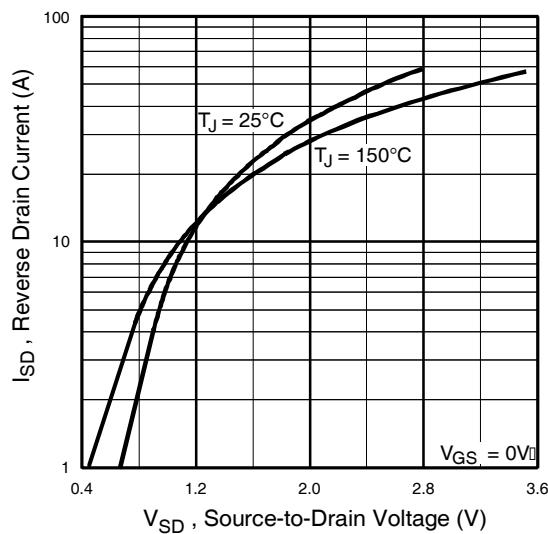


Fig 7. Typical Source-Drain Diode
Forward Voltage

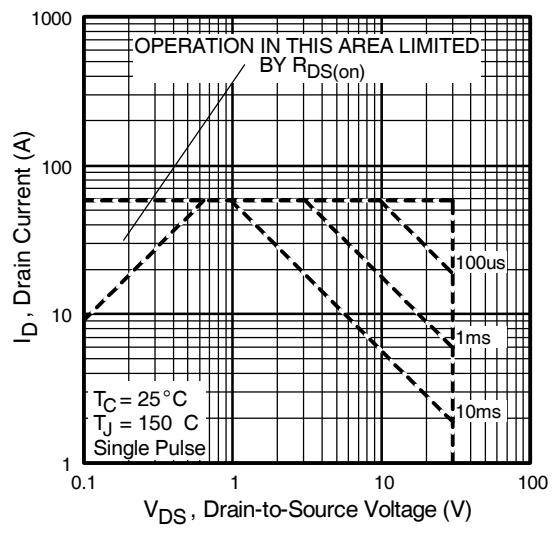


Fig 8. Maximum Safe Operating Area

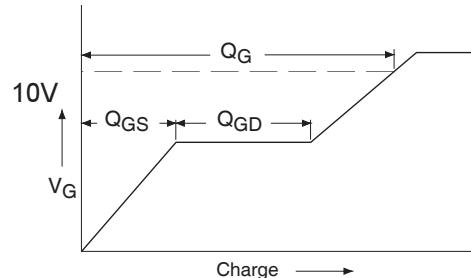


Fig 9a. Basic Gate Charge Waveform

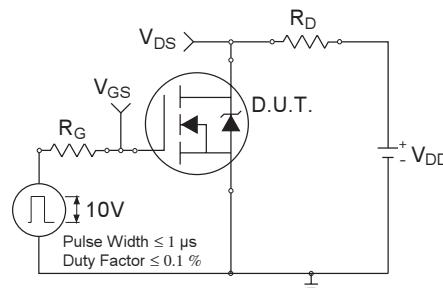


Fig 10a. Switching Time Test Circuit

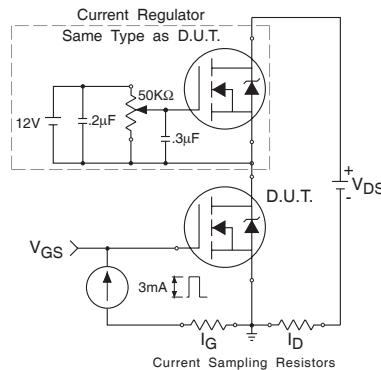


Fig 9b. Gate Charge Test Circuit

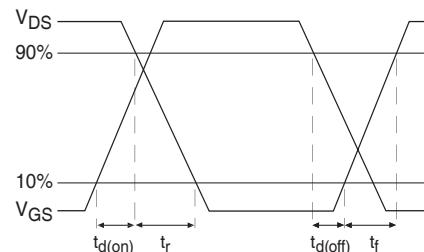


Fig 10b. Switching Time Waveforms

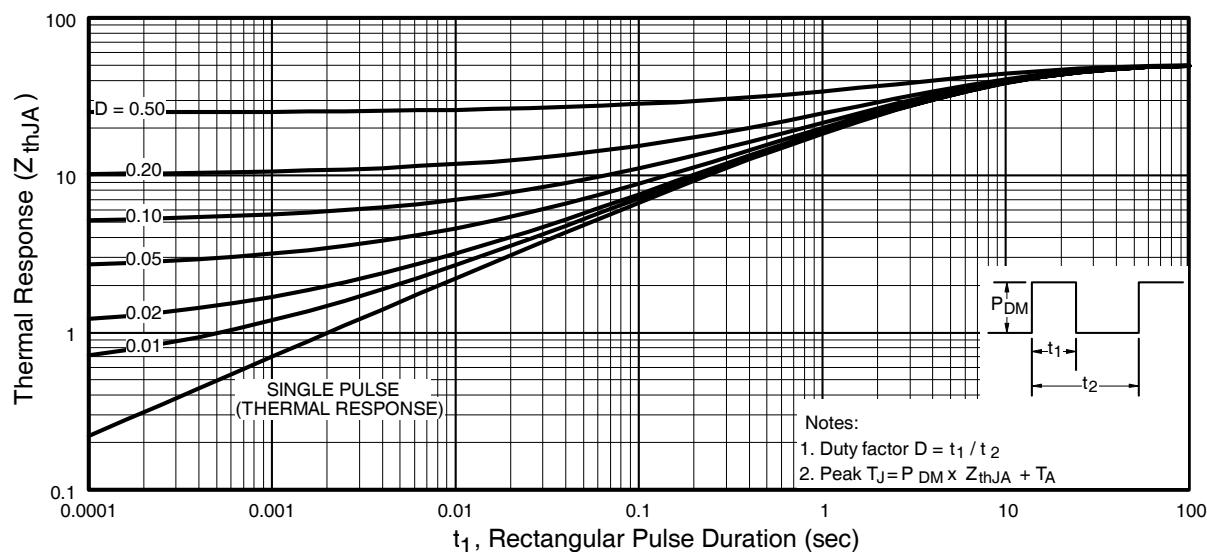


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

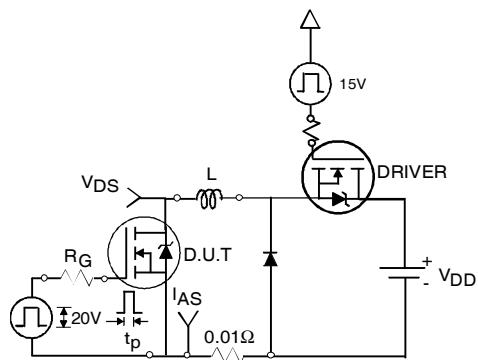


Fig 12a. Unclamped Inductive Test Circuit

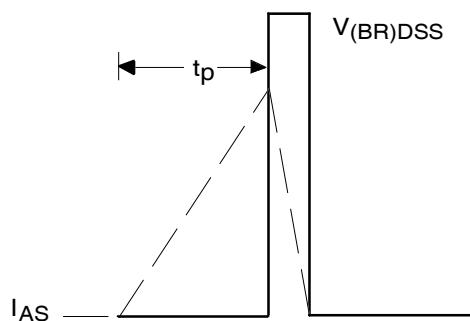


Fig 12b. Unclamped Inductive Waveforms

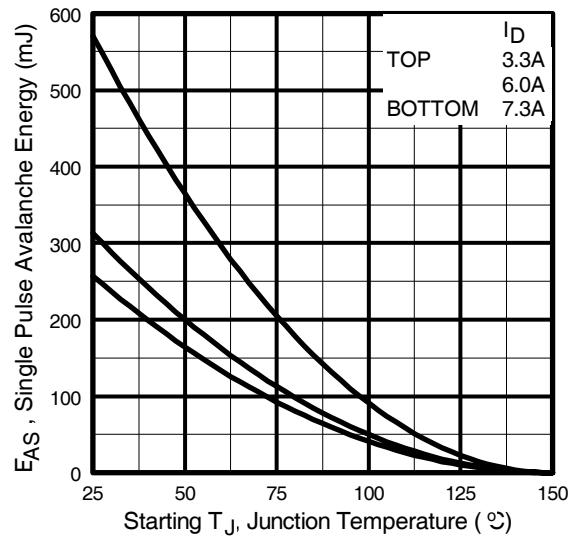
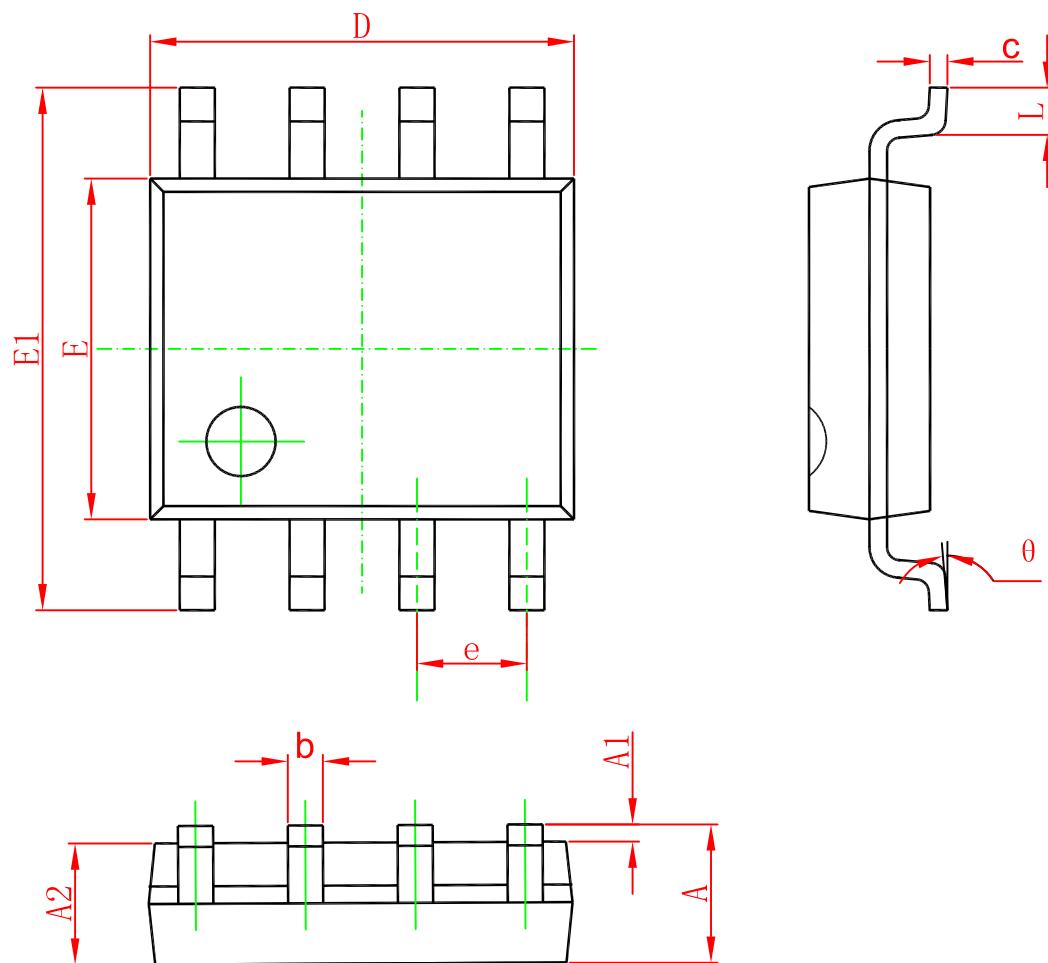


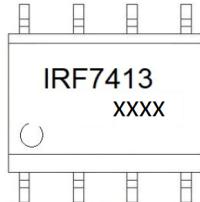
Fig 12c. Maximum Avalanche Energy Vs. Drain Current

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
θ	0°	8°	0°	8°

Marking



Ordering information

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