

1.Description

The SOP-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red, or wave soldering techniques. Power dissipation of greater than 0.8W is possible in a typical PCB mount application.

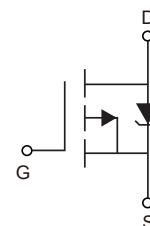
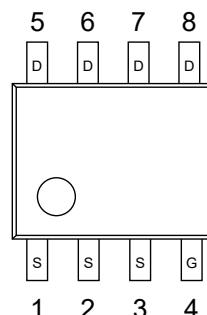
2.Features

- $V_{DS(V)} = -20V$
- $R_{DS(ON)} < 40m\Omega$ ($V_{GS} = -4.5V$)
- $R_{DS(ON)} < 60m\Omega$ ($V_{GS} = -2.7V$)
- Generation V Technology
- Ultra Low On-Resistance
- Surface Mount
- Dynamic dv/dt Rating
- Fast Switching
- Lead-Free

3.Pinning information

Pin	Symbol	Description
1,2,3	S	SOURCE
4	G	GATE
5,6,7,8	D	DRAIN

SOP-8



4.Absolute Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Parameter		Symbol	Rating	Units
10 Sec. Pulsed Drain Current, $V_{GS} = -4.5V$	$T_A = 25^\circ C$	I_D	-7.7	A
Continuous Drain Current, $V_{GS} = -4.5V$	$T_A = 25^\circ C$		-6.7	A
Continuous Drain Current, $V_{GS} = -4.5V$	$T_A = 70^\circ C$		-5.4	A
Pulsed Drain Current ①		I_{DM}	-27	A
Power Dissipation	$T_A = 25^\circ C$	P_D	2.5	W
Linear Derating Factor			0.02	W/ $^\circ C$
Gate-to-Source Voltage		V_{GS}	± 12	V
Peak Diode Recovery dv/dt ②		dv/dt	-5	V/ns
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ C$



5.Thermal resist ance rating

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ④	R _{θJA}		50	°C/W



6. Electrical Characteristics $T_J=25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-20			V
Breakdown Voltage Temp. Coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	$I_D=-1\text{mA}$, Reference to 25°C		-0.012		V/ $^{\circ}\text{C}$
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-4.5\text{V}$, $I_D=-3.2\text{A}$ ③			40	m Ω
		$V_{GS}=-2.7\text{V}$, $I_D=-2.7\text{A}$ ③			60	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-0.7			V
Forward Transconductance	g_{FS}	$V_{DS}=-15\text{V}$, $I_D=-3.2\text{A}$	6.8			S
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=-16\text{V}$, $V_{GS}=0\text{V}$			-1	μA
		$V_{DS}=-16\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^{\circ}\text{C}$			-25	
Gate-to-Source Forward Leakage	I_{GSS}	$V_{GS}=-12\text{V}$			-100	nA
Gate-to-Source Reverse Leakage		$V_{GS}=12\text{V}$			100	
Total Gate Charge	Q_g	$I_D=-3.2\text{A}$			50	nC
Gate-to-Source Charge	Q_{gs}	$V_{DS}=-16\text{V}$, $V_{GS}=-4.5\text{V}$			5.5	
Gate-to-Drain ("Miller") Charge	Q_{gd}	See Fig. 6 and 12 ③			21	
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=-10\text{V}$		14		ns
Rise Time	t_r	$I_D=-3.2\text{A}$		32		ns
Turn-Off Delay Time	$t_{D(off)}$	$R_G=6\Omega$		100		ns
Fall Time	t_f	$R_D=3.1\Omega$, See Fig. 10 ③		65		ns
Internal Drain Inductance	L_D	Between lead tip and center of die contact		2.5		nH
Internal Source inductance	L_S			4		
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$		1500		pF
Output Capacitance	C_{oss}	$V_{DS}=-15\text{V}$		730		pF
Reverse Transfer Capacitance	C_{rss}	$f=1.0\text{MHz}$, See Fig.5		340		pF



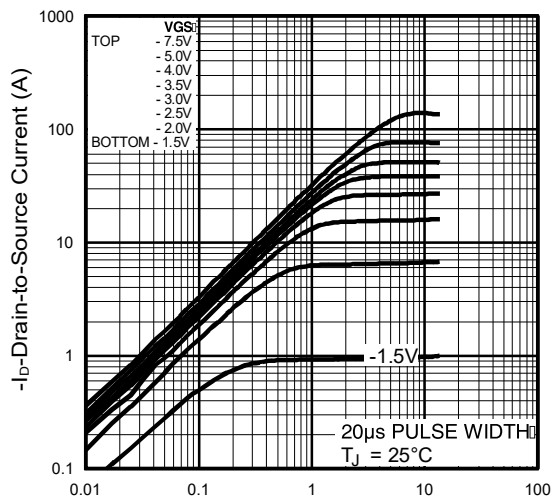
Source-Drain Ratings and Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			-3.1	A
Pulsed Source Current (Body Diode) ①	I_{SM}				-27	
Diode Forward Voltage	V_{SD}	$T_J=25^\circ\text{C}, I_S=-2\text{A}, V_{GS}=0\text{V}$ ③			-1	V
Reverse Recovery Time	t_{rr}	$T_J=25^\circ\text{C}, I_F=-3.2\text{A}$		69	100	ns
Reverse Recovery Charge	Q_{rr}	$di/dt=100\text{A}/\mu\text{s}$ ③		71	110	μC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

- ① Repetitive rating; pulse width limited by max.junction temperature.(See fig.11)
- ② $I_{SD} \leq -3.2\text{A}$, $di/dt \leq -65\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150^\circ\text{C}$.
- ③ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ Surface mounted on FR-4 board, $t \leq 10\text{sec}$.

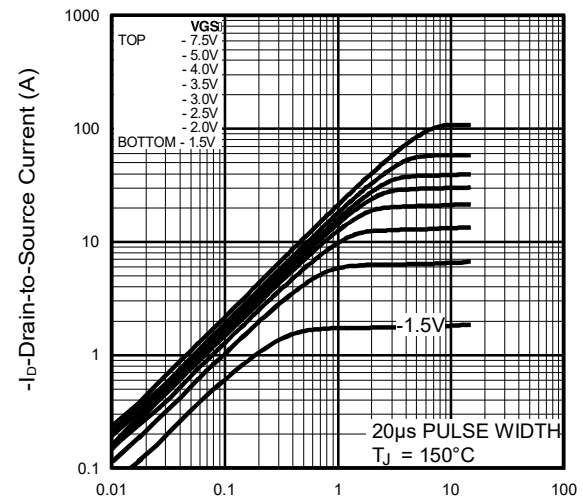


7.1 Typical Characteristics



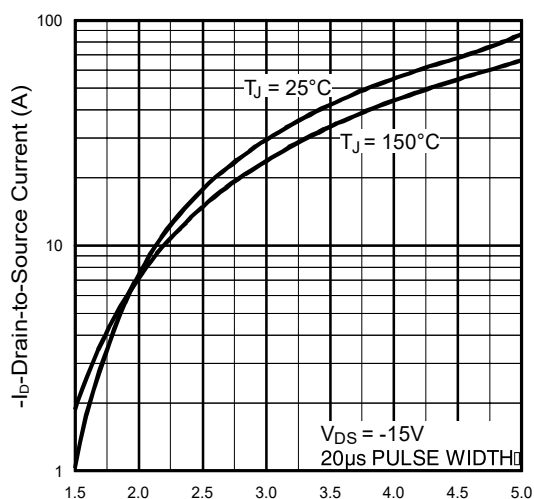
$-V_{DS}$ - Drain-to-Source Voltage (V)

Fig 1. Typical Output Characteristics



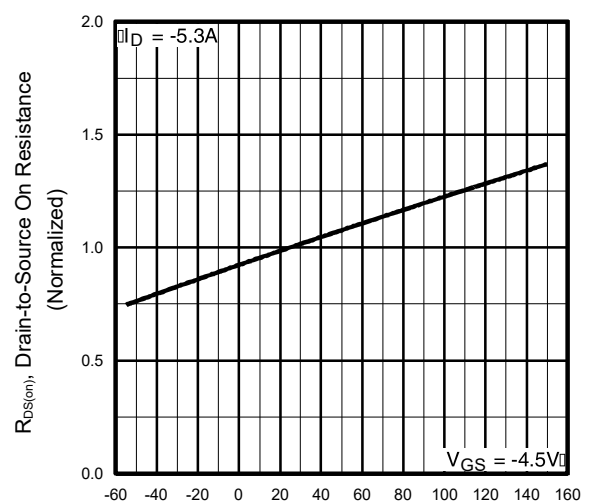
$-V_{DS}$ - Drain-to-Source Voltage (V)

Fig 2. Typical Output Characteristics



$-V_{GS}$, Gate-to-Source Voltage (V)

Fig 3. Typical Transfer Characteristics

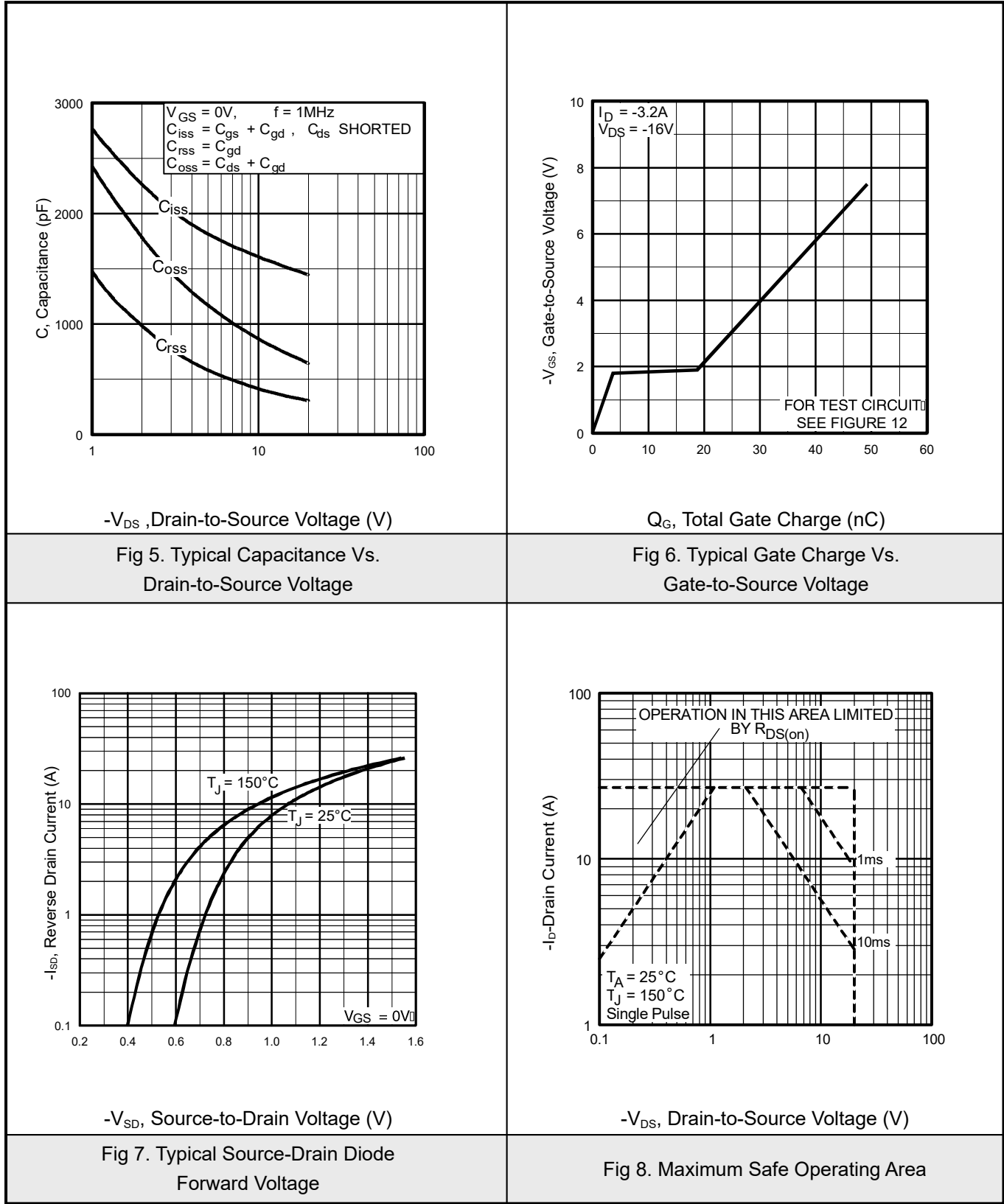


T_J , Junction Temperature ($^{\circ}\text{C}$)

Fig 4. Normalized On-Resistance vs. Temperature



7.2Typical Characteristics





7.3 Typical Characteristics

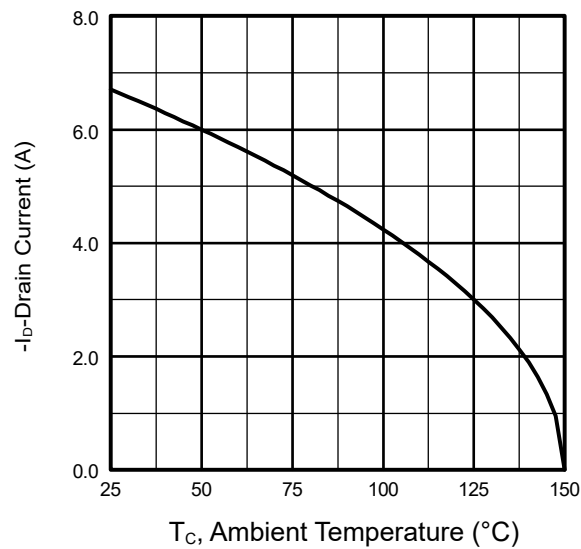


Fig 9. Maximum Drain Current Vs.AmbientTemperature

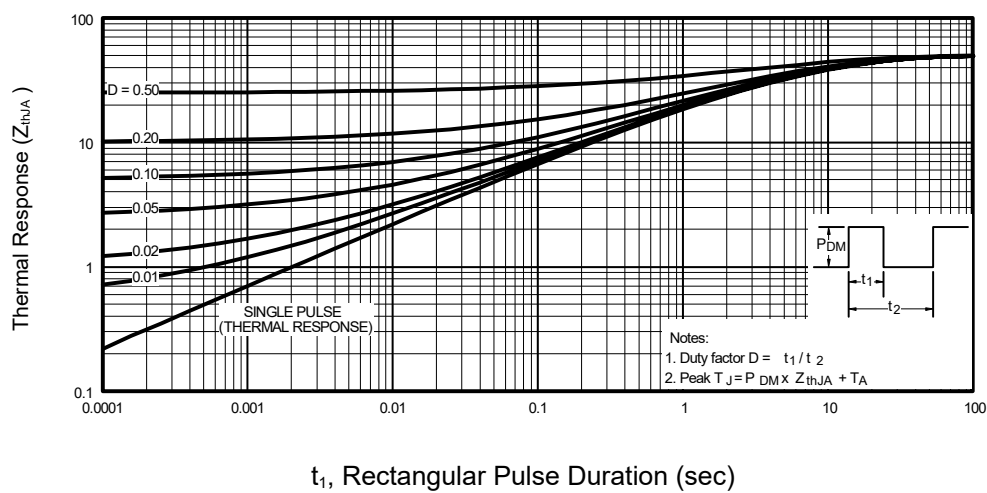


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



7.4 Typical Characteristics

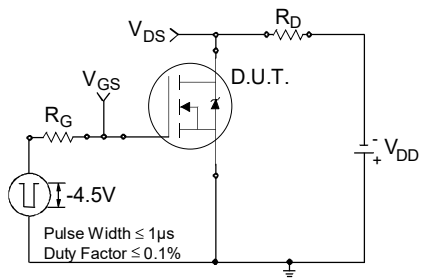


Fig 11a. Switching Time Test Circuit

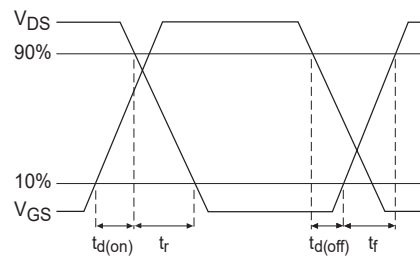


Fig 11b. Switching Time Waveforms

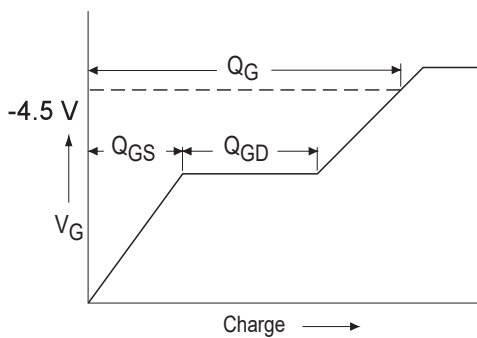


Fig 12a. Basic Gate Charge Waveform

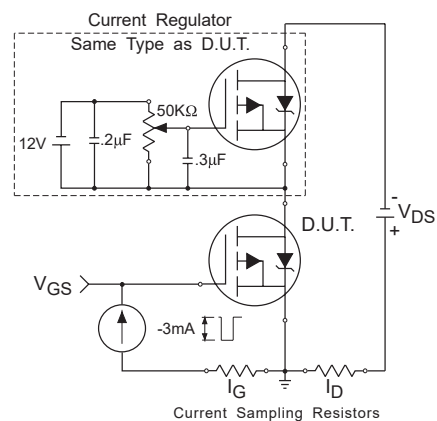
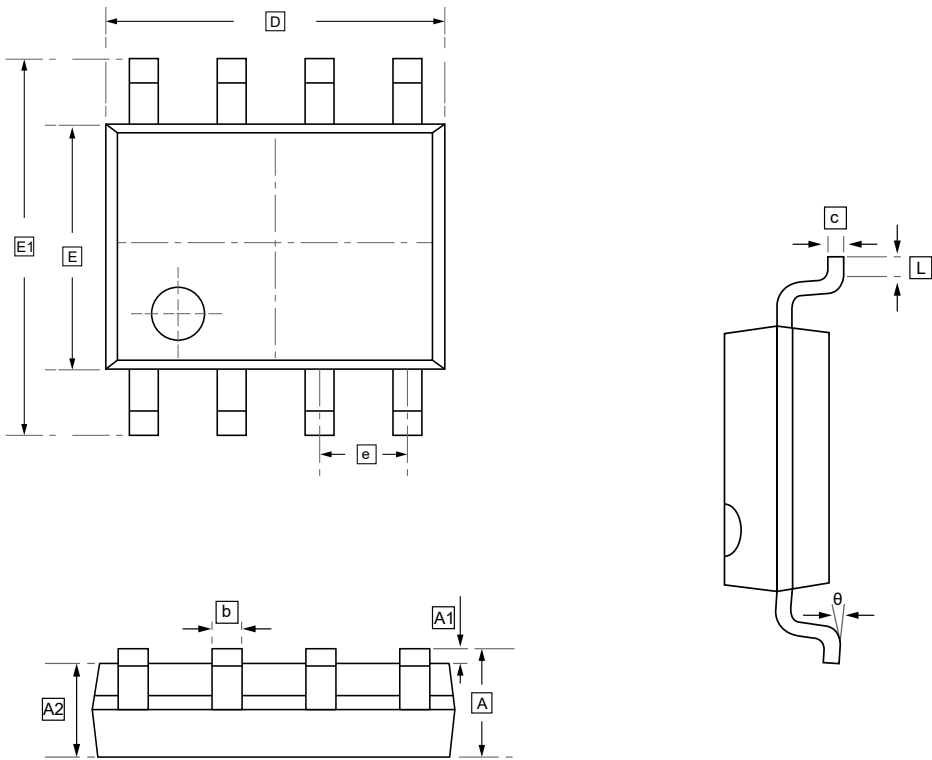


Fig 12b. Gate Charge Test Circuit



8.SOP-8 Package Outline Dimensions

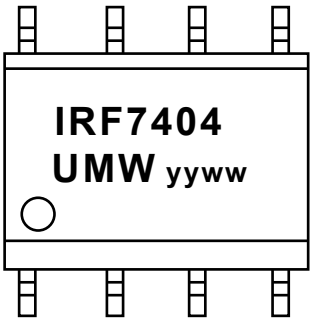


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°



9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRF7404TR	SOP-8	3000	Tape and reel



10.Disclaimer

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