

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.

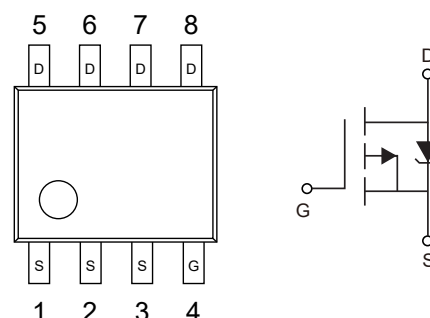
2.Features

- $V_{DS(V)} = -20V$
- $R_{DS(ON)} < 40m\Omega$ ($V_{GS} = -4.5V$)
- $R_{DS(ON)} < 60m\Omega$ ($V_{GS} = -2.7V$)
- Generation VTechnology
- 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 Resistance Rating

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ④	$R_{\theta JA}$		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)				

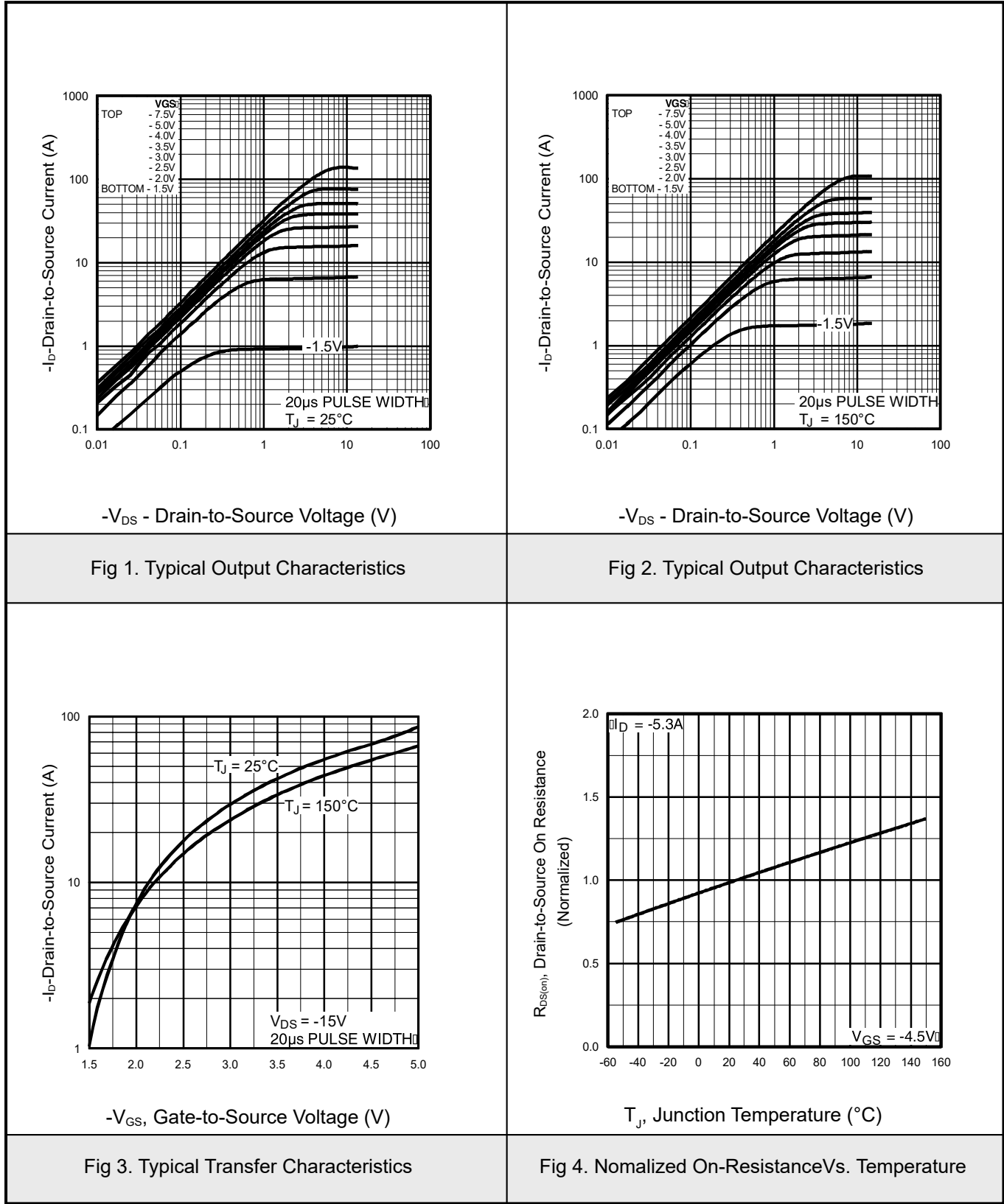
Notes:

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, $t \leq 10\text{sec}$.

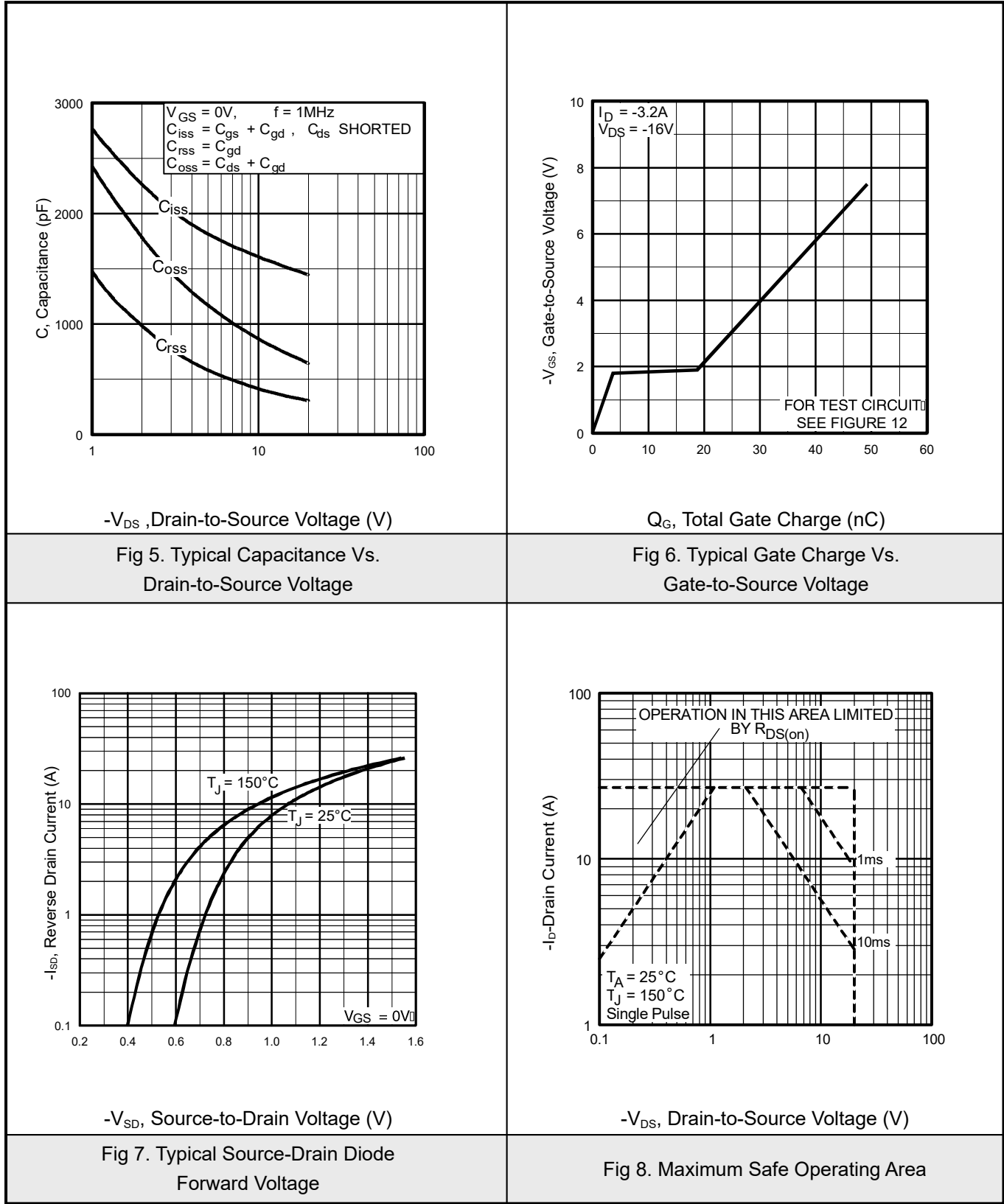


7.1 Typical Characteristics





7.2Typical Characteristics





7.3 Typical Characteristics

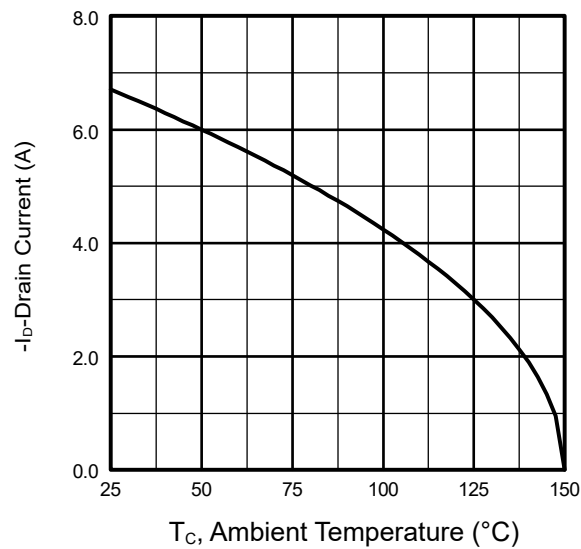


Fig 9. Maximum Drain Current Vs. Ambient Temperature

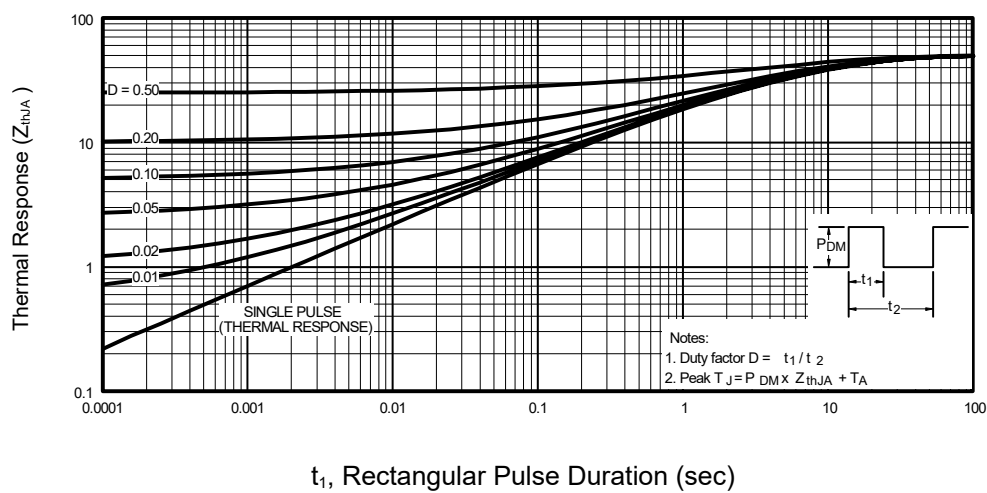


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



7.4 Typical Characteristics

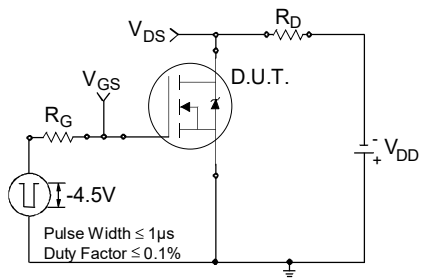


Fig 11a. Switching Time Test Circuit

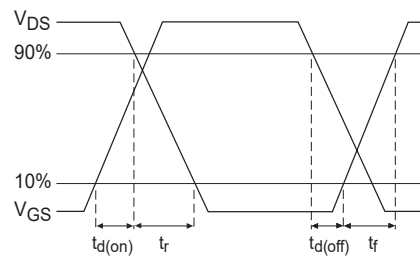


Fig 11b. Switching Time Waveforms

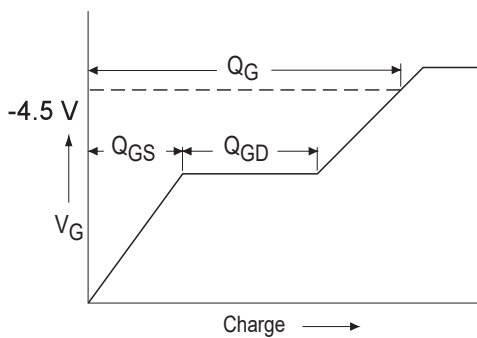


Fig 12a. Basic Gate Charge Waveform

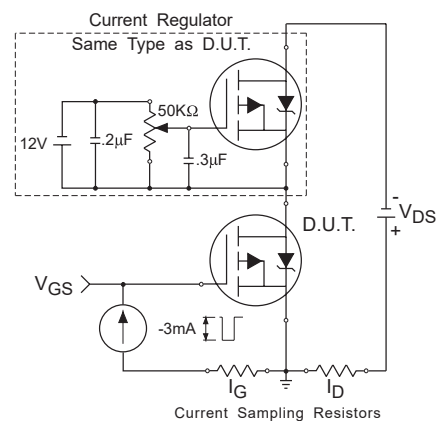
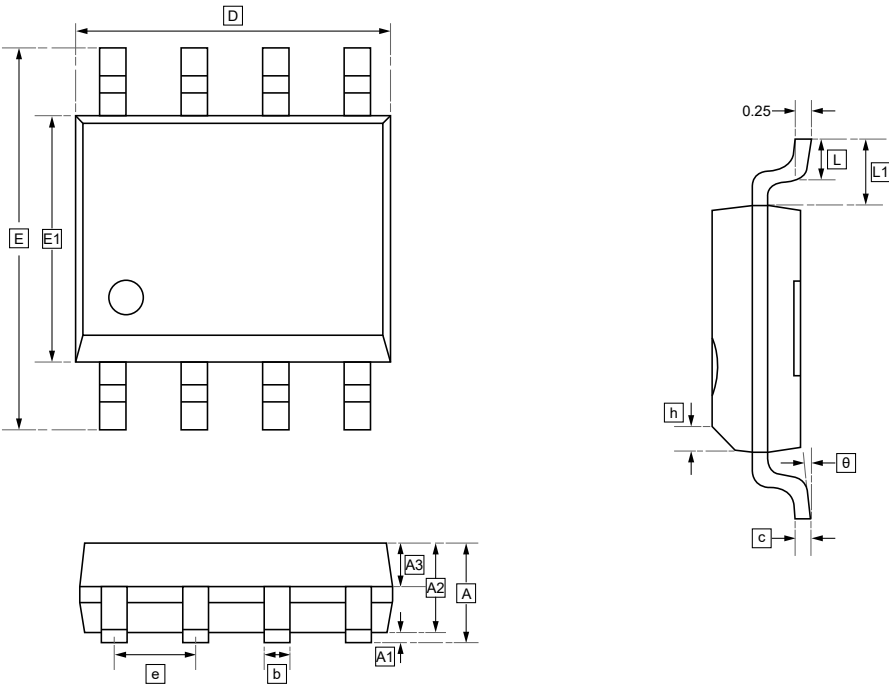


Fig 12b. Gate Charge Test Circuit



8.SOP-8 Package Outline Dimensions



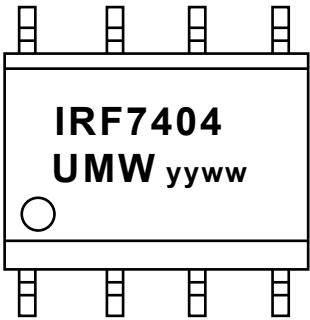
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.80	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.00	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	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

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.