

## DESCRIPTION

The SI4906DY-T1-E3 is the N-Channel logic enhancement mode power field effect transistor, is produced using high cell density advanced trench technology.

This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application, notebook computer power management and other battery powered circuits.

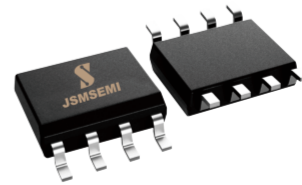
## FEATURE

- ◆ 60V/6.3A,  $R_{DS(ON)}=30m\Omega$  (typ.)@VGS= 10V
- ◆ 60V/5.0A,  $R_{DS(ON)}=37m\Omega$  (typ.)@VGS= 4.5V
- ◆ Super high design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and Maximum DC current capability
- ◆ Full RoHS compliance
- ◆ SOP8 package design

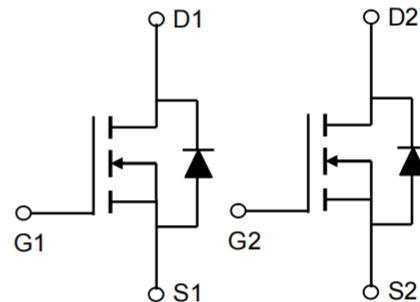
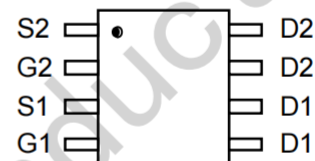
## APPLICATIONS

- ◆ Power Management
- ◆ Portable Equipment
- ◆ DC/DC Converter
- ◆ Load Switch
- ◆ DSC
- ◆ LCD Display inverter

## PIN CONFIGURATION



Top View



## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ Unless otherwise noted )

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ\text{C}$	6.3	A
	$T_A=70^\circ\text{C}$	5	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	40	
Power Dissipation	$T_A=25^\circ\text{C}$	2	W
	$T_A=70^\circ\text{C}$	1.28	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

Thermal Characteristics					
Parameter	Symbol	Typ	Max	Units	
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	50	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State		73	110	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	31	40	$^\circ\text{C/W}$

**Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress rating only and functional device operation is not implied**

**ELECTRICAL CHARACTERISTICS** ( $T_A=25\text{ }^\circ\text{C}$  Unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.8	3.0	V
$I_{GSS}$	Gate Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=48V, V_{GS}=0$			1	uA
		$V_{DS}=48V, V_{GS}=0$ $T_J=55\text{ }^\circ\text{C}$			5	
$R_{DS(ON)}$	Drain-Source On-Resistance	$V_{GS}=10V, I_D=6.3A$		30	45	m $\Omega$
		$V_{GS}=4.5V, I_D=5.0A$		37	55	
<b>Source-Drain Diode</b>						
$V_{SD}$	Diode Forward Voltage	$I_S=1.0A, V_{GS}=0V$		0.8	1.3	V
<b>Dynamic Parameters</b>						
$Q_g$	Total Gate Charge	$V_{DS}=30V$ $V_{GS}=10V$ $I_D=5.0A$		15.6	16	nC
$Q_{gs}$	Gate-Source Charge			1.3		
$Q_{gd}$	Gate-Drain Charge			4.5		
$C_{iss}$	Input Capacitance	$V_{DS}=25V$ $V_{GS}=0V$ $f=1MHz$		520		pF
$C_{oss}$	Output Capacitance			105		
$C_{riss}$	Reverse Transfer Capacitance			60		
$T_{d(on)}$	Turn-On Time	$V_{DS}=30V$ $I_D=1A$		8	16	nS
$T_r$				6	12	
$T_{d(off)}$	Turn-Off Time	$V_{GEN}=10V$ $R_G=6\Omega$		25	46	
$T_f$				4	8	

Note: 1. Pulse test: pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$

2. Static parameters are based on package level with recommended wire bonding

■ **TYPICAL CHARACTERISTICS** (25°C Unless Note)

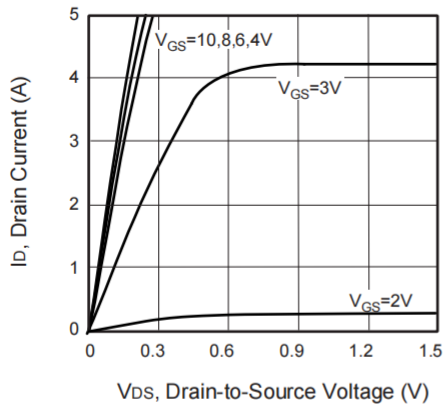


Figure 1. Output Characteristics

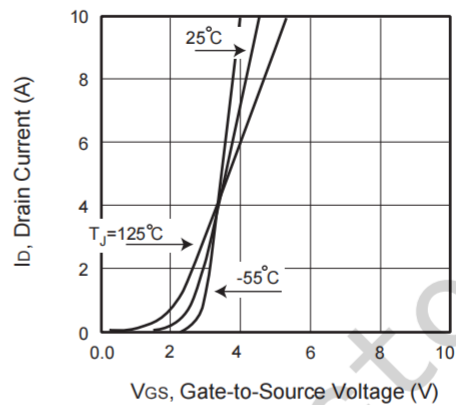


Figure 2. Transfer Characteristics

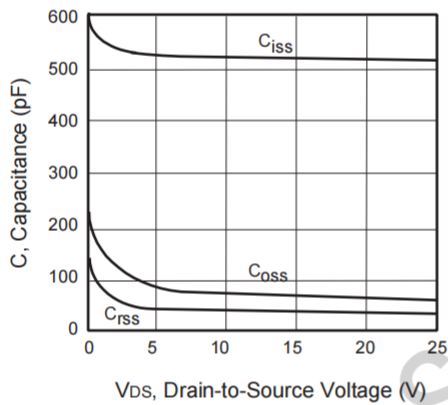


Figure 3. Capacitance

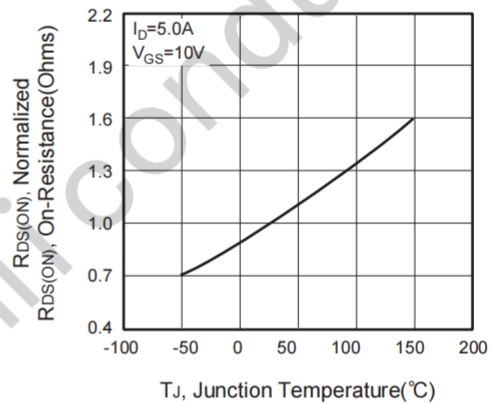


Figure 4. On-Resistance Variation with Temperature

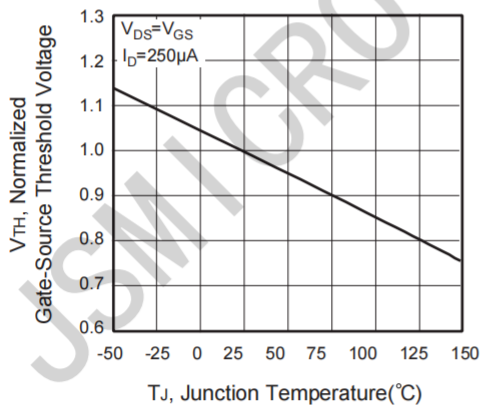


Figure 5. Gate Threshold Variation with Temperature

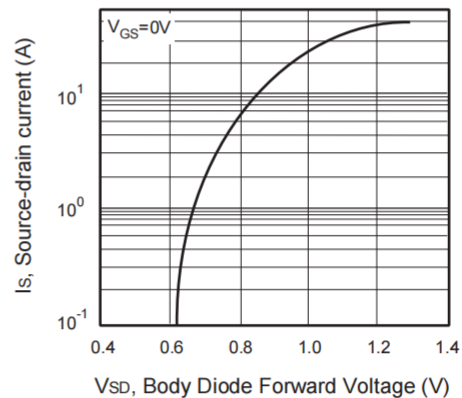


Figure 6. Body Diode Forward Voltage Variation with Source Current

■ **TYPICAL CHARACTERISTICS (continuous)**

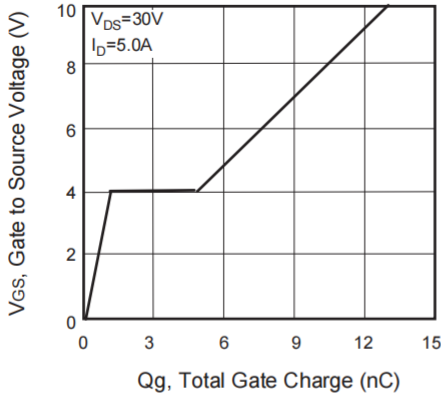


Figure 7. Gate Charge

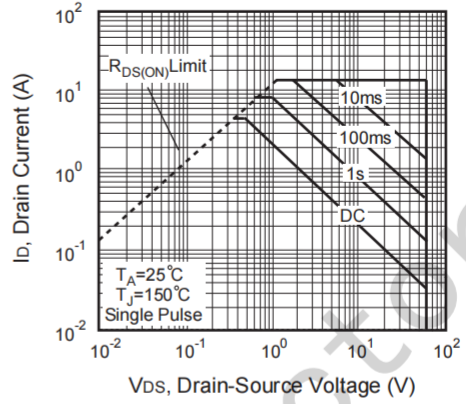


Figure 8. Maximum Safe Operating Area

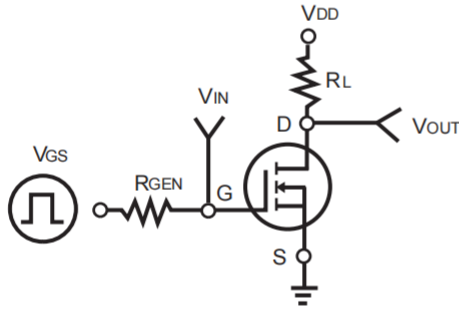


Figure 9. Switching Test Circuit

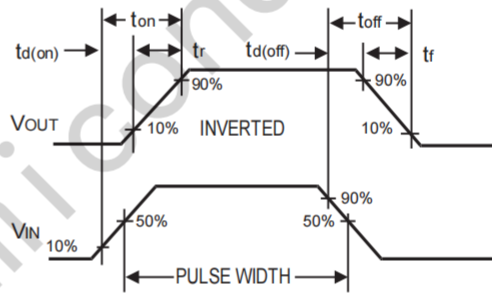


Figure 10. Switching Waveforms

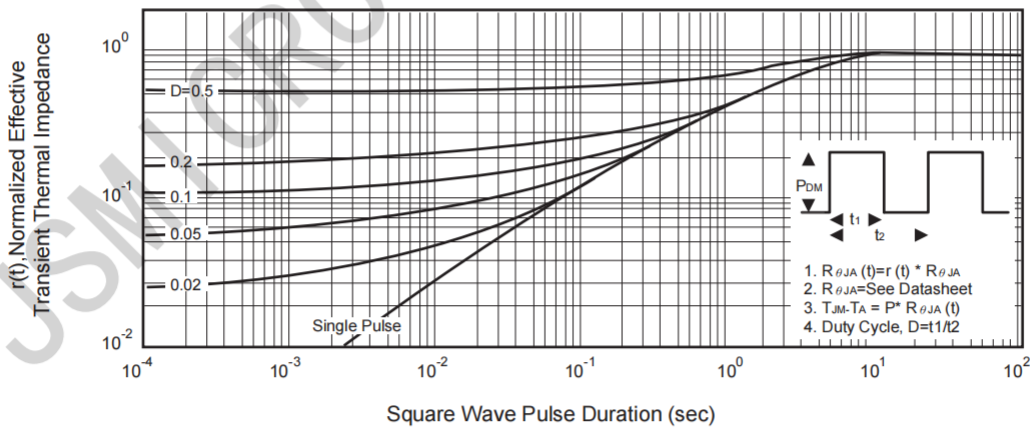
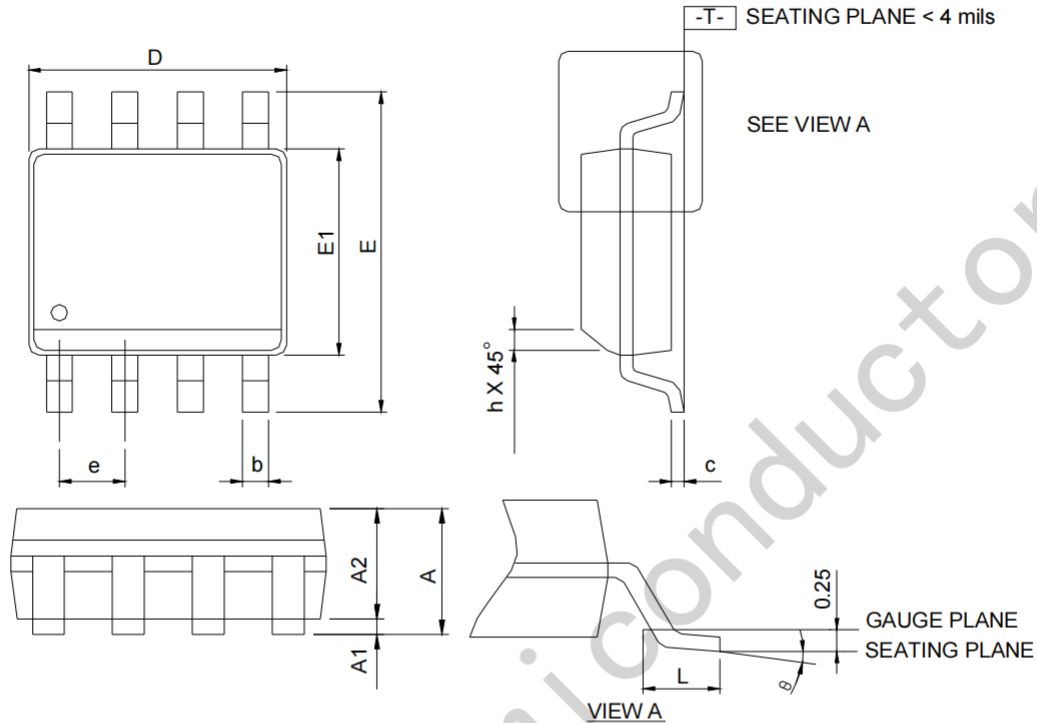


Figure 11. Normalized Thermal Transient Impedance Curve

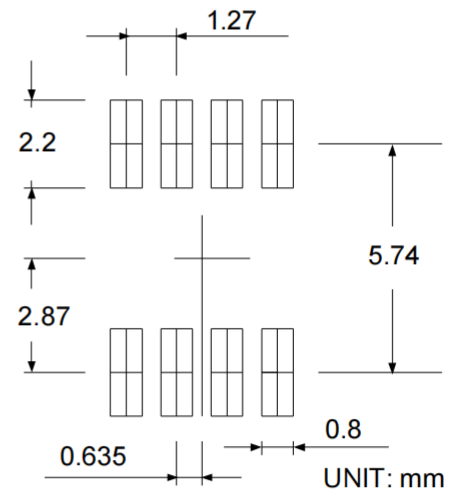
## Package Information

SOP-8



SYMBOLS	SOP-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	-	1.75	-	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	-	0.049	-
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

### RECOMMENDED LAND PATTERN



Note: 1. Follow JEDEC MS-012 AA.

2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.

3. Dimension "E" does not include inter-lead flash or protrusions. Inter-lead flash and protrusions shall not exceed 10 mil per side.