SOP-8 Plastic-Encapsulate MOSFETS

4410

N-Channel Enhancement Mode Power MOSFET

Description

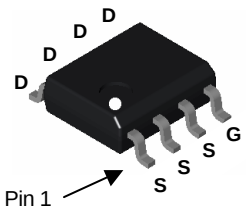
The 4410 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge . The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

General Features

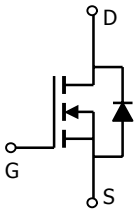
PRODUCT SUMMARY		
V_{DSS}	I_D	$R_{DS(on)}$ (mΩ) Max
30V	10 A	13.5 @ V_{GS} = 10V
	5 A	18.0 @ V_{GS} = 4.5V

- High power and current handing capability
- Lead free product is acquired
- Surface mount package

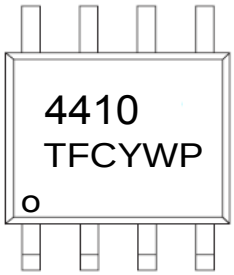
SO-8L



Equivalent Circuit



MARKING



Y :year code W :week code

Absolute Maximum Ratings T_A=25°C unless otherwise noted				
Parameter		**Symbol**	**Maximum**	**Units**
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [A]	T_A=25°C	I_D	10	A
Pulsed Drain Current [B]		I_{DM}	45	
Power Dissipation [A]	T_A=25°C	P_D	2.3	W
	T_A=70°C		1.6	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics					
Parameter		**Symbol**	**Typ**	**Max**	**Units**
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	48	62.5	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		74	110	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	35	40	°C/W

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Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D= 250μA, V_{GS}=0V	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= 24V, V_{GS}=0V			500	nA
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±20V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D= 250μA	1.0	1.6	2.5	V
$I_{D(ON)}$	On state drain current	V_{GS}= 10V , V_{DS}= 5V			45	A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}= 10V, I_D= 10A		11	13.5	mΩ
		V_{GS}= 4.5V, I_D= 5A		16	18.0	mΩ
g_{FS}	Forward Transconductance	V_{DS}= 15V, I_D= 10A		9		S
V_{SD}	Diode Forward Voltage	I_S= 3A , V_{GS}=0V		0.8	1.2	V
I_S	Maximum Body-Diode Continuous Current				3	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz		710		pF
C_{oss}	Output Capacitance			155		pF
C_{rss}	Reverse Transfer Capacitance			145		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz			3.0	Ω
SWITCHING PARAMETERS						
Q_g (10V)	Total Gate Charge (10V)	V_{DD}= 20V, V_{GEN} = 10V, I_D= 9A		8		nC
Q_g (4.5V)	Total Gate Charge (4.5V)			6.2		nC
Q_{gs}	Gate Source Charge			3.3		nC
Q_{gd}	Gate Drain Charge			2.7		nC
$t_{D(on)}$	Turn-On DelayTime	V_{DD}= 15V, V_{GEN}= 10V,R_L= 15Ω R_{GEN}=3Ω I_D= 9A		7.0		ns
t_r	Turn-On Rise Time			7.0		ns
$t_{D(off)}$	Turn-Off DelayTime			22		ns
t_f	Turn-Off Fall Time			7.0		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F= 10A, dI/dt=100A/μs		24		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F= 10A, dI/dt=100A/μs		14		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80μs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

Characteristics Curve

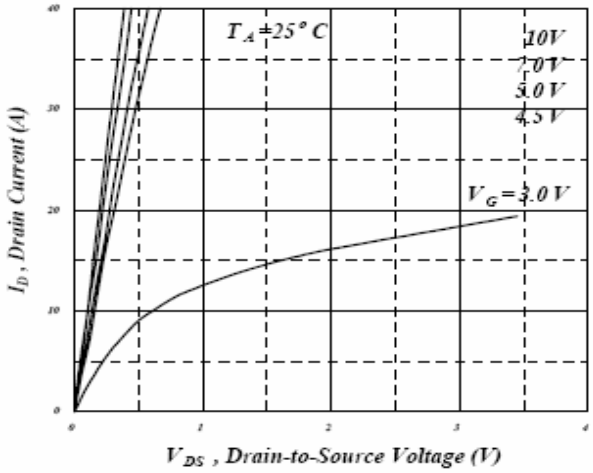

Fig 1. Typical Output Characteristics

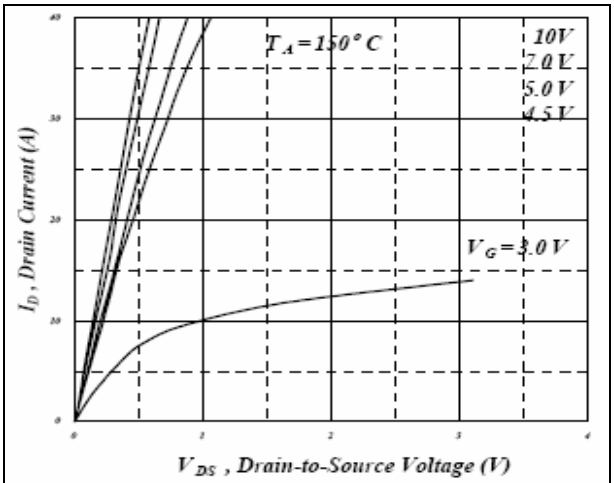

Fig 2. Typical Output Characteristics

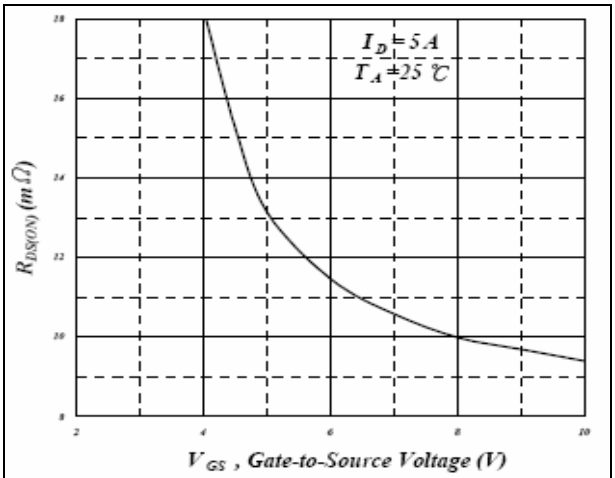

Fig 3. On-Resistance v.s. Gate Voltage

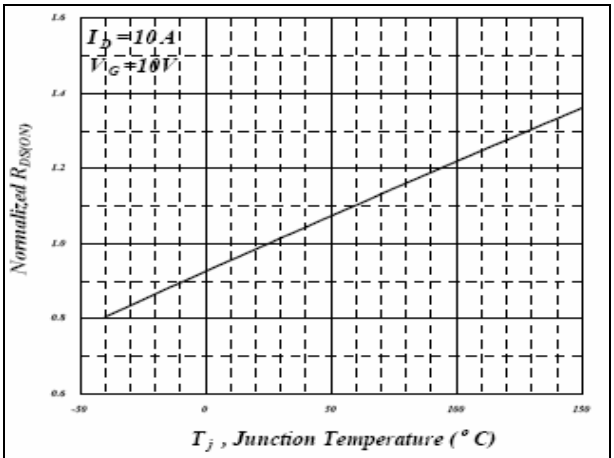

Fig 4. Normalized On-Resistance v.s. Junction Temperature

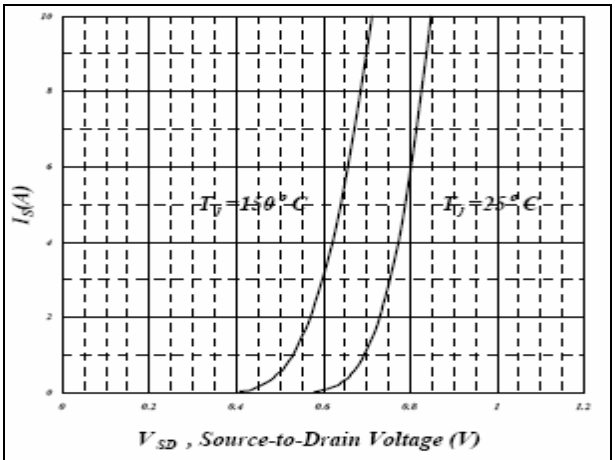

Fig 5. Forward Characteristic of Reverse Diode

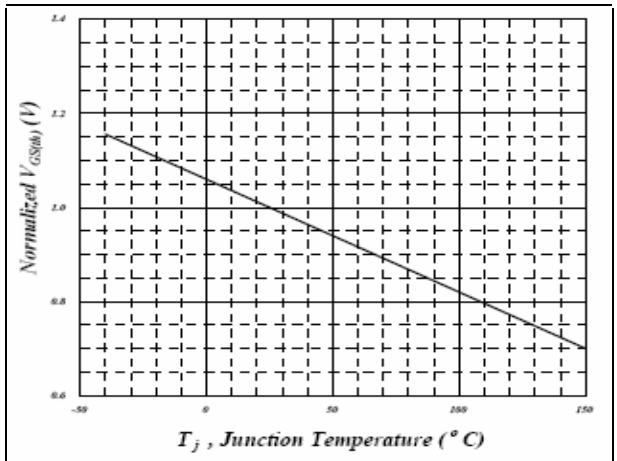

Fig 6. Gate Threshold Voltage v.s. Junction Temperature

Characteristics Curve

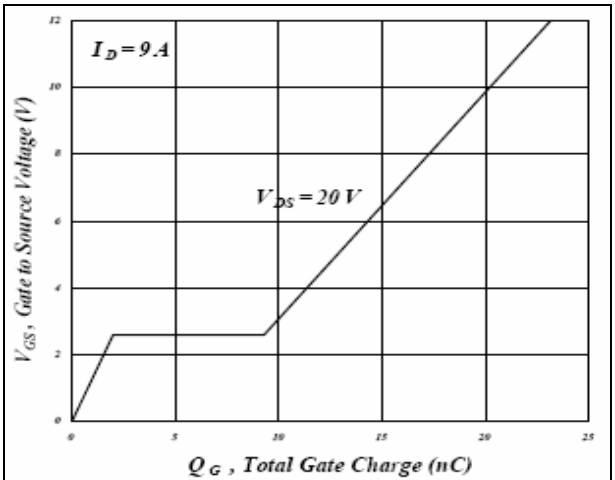

Fig 7. Gate Charge Characteristics

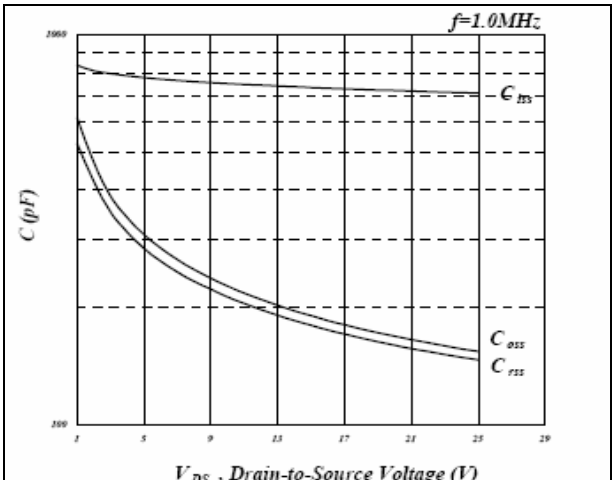

Fig 8. Typical Capacitance Characteristics

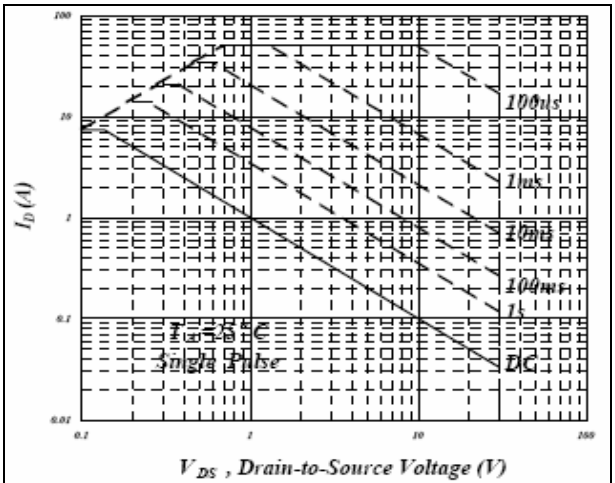

Fig 9. Maximum Safe Operating Area

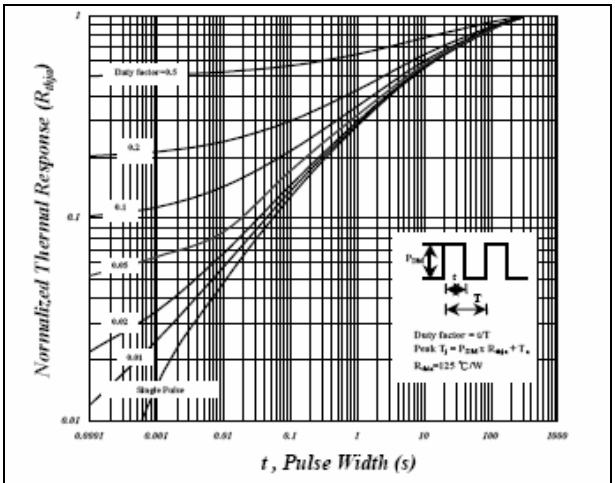

Fig 10. Effective Transient Thermal Impedance

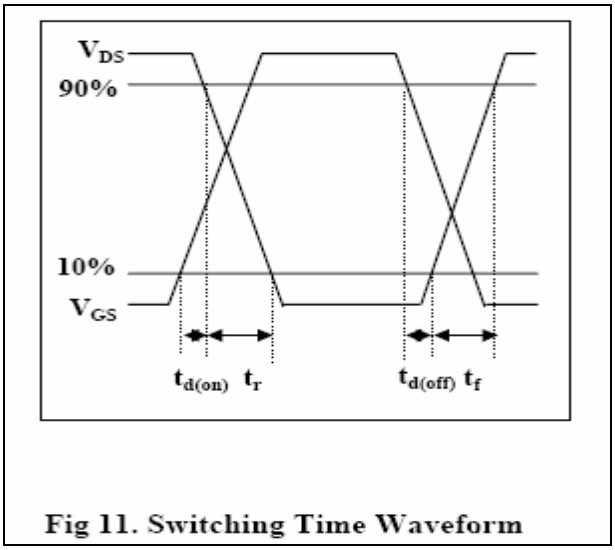

Fig 11. Switching Time Waveform

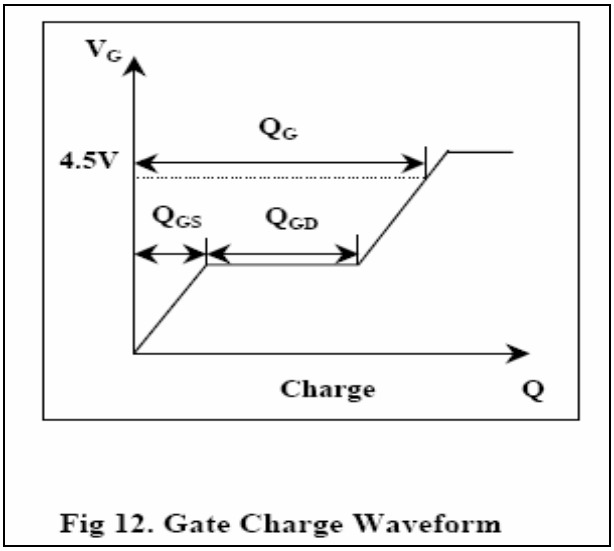

Fig 12. Gate Charge Waveform

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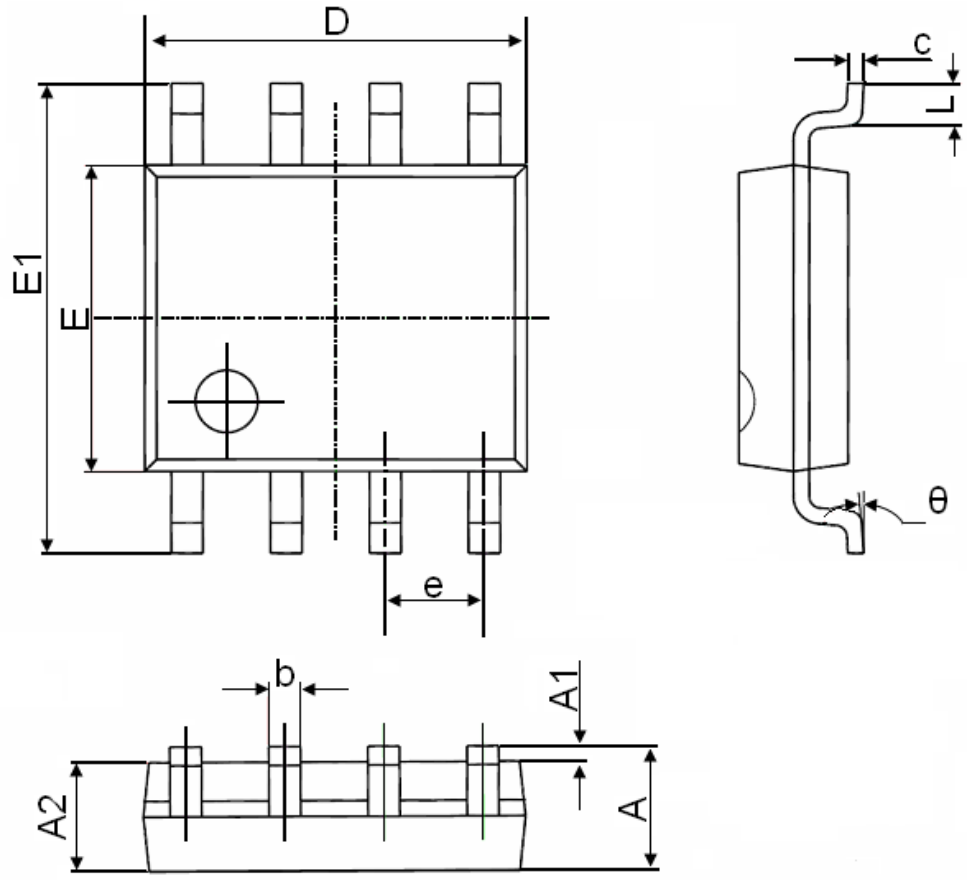
SOP-8 Package Information



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°