

P & N-Channel 30-V (D-S) MOSFET

■ Features

- Low $r_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
- Miniature SO-8 Surface Mount Package Saves Board Space
- High power and current handling capability
- Low side high current DC-DC Converter applications

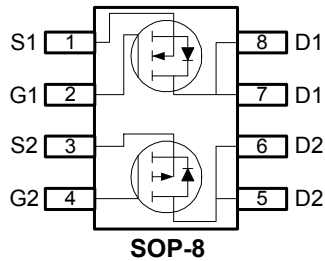
■ General Description

These miniature surface mount MOSFETs utilize High Cell Density process. Low $r_{DS(on)}$ assures minimal power loss and conserves energy, making this device ideal for use in power management circuitry. Typical applications are PWMDC-DC converters, power management in portable and battery-powered products such as computers, printers, battery charger, telecommunication power system, and telephones power system.

■ Product Summary

V_{DS} (V)	$r_{DS(on)}$ (m Ω)	I_D (A)
30	40@ $V_{GS}=4.5V$	6.0
	28@ $V_{GS}=10V$	7.0
-30	80@ $V_{GS}=-4.5V$	-4.0
	52@ $V_{GS}=-10V$	-5.2

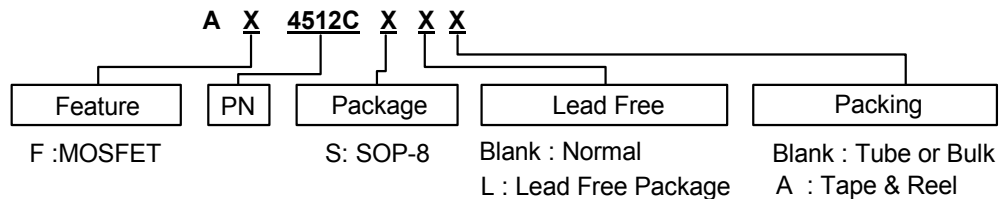
■ Pin Assignments



■ Pin Descriptions

Pin Name	Description
S1	Source (NMOS)
G1	Gate (NMOS)
D1	Drain (NMOS)
S2	Source (PMOS)
G2	Gate (PMOS)
D2	Drain (PMOS)

■ Ordering information





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■ Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	20	-20	
I_D	Continuous Drain Current (Note 1)	$T_A=25^\circ\text{C}$	-5.2	A
		$T_A=70^\circ\text{C}$	-6.8	
I_{DM}	Pulsed Drain Current (Note 2)	20	-20	A
I_S	Continuous Source Current (Diode Conduction) (Note 1)	1.3	-1.3	A
P_D	Power Dissipation (Note 1)	$T_A=25^\circ\text{C}$	2.1	W
		$T_A=70^\circ\text{C}$	1.3	
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-	-55 to 150	$^\circ\text{C}$

■ Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JC}$	Maximum Junction-to-Case (Note 1)	40	$^\circ\text{C/W}$
$R_{\theta JA}$	Maximum Junction-to-Ambient (Note 1)	60	$^\circ\text{C/W}$

Note 1: surface Mounted on 1"x 1" FR4 Board.

Note 2: Pulse width limited by maximum junction temperature

■ Specifications ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Limits				Unit
			Ch	Min.	Typ.	Max.	
Static							
$V_{(BR)DSS}$	Drain-Source breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	N	30	-	-	V
		$V_{GS}=0V, I_D=-250\mu A$	P	-30	-	-	
$V_{GS(th)}$	Gate-Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	N	1	1.95	3	V
		$V_{DS}=V_{GS}, I_D=-250\mu A$	P	-1.0	-1.7	-3	
I_{GSS}	Gate-Body Leakage	$V_{GS}=20V, V_{DS}=0V$	N	-	-	± 100	nA
		$V_{GS}=-20V, V_{DS}=0V$	P	-	-	± 100	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=24V, V_{GS}=0V$	N	-	-	1	uA
		$V_{DS}=-24V, V_{GS}=0V$	P	-	-	-1	
$I_{D(on)}$	On-State Drain Current (Note 3)	$V_{DS}=5V, V_{GS}=10V$	N	20	-	-	A
		$V_{DS}=-5V, V_{GS}=-10V$	P	-20	-	-	
$r_{DS(on)}$	Drain-Source On-Resistance (Note 3)	$V_{GS}=10V, I_D=7A$	N	-	19	28	m Ω
		$V_{GS}=4.5V, I_D=6A$		-	24	40	
		$V_{GS}=-10V, I_D=-5A$	P	-	42	52	
		$V_{GS}=-4.5V, I_D=-4A$		-	65	80	
g_{fs}	Forward Transconductance (Note 3)	$V_{DS}=15V, I_D=7A$	N	-	25	-	S
		$V_{DS}=-15V, I_D=-5A$	P	-	10	-	



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■ Specifications ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Limits				Unit	
			Ch	Min.	Typ.	Max.		
Dynamic								
Q_g	Total Gate Charge	N-Channel $V_{DS}=15\text{V}, V_{GS}=10\text{V}$	N	-	10.7	26	nC	
			P	-	10	13		
Q_{gs}	Gate-Source Charge	I _D =7A P-Channel	N	-	1.7	-		
			P	-	2.2	-		
Q_{gd}	Gate-Drain Charge	$V_{DS}=-15\text{V}, V_{GS}=-10\text{V}$ I _D =-5A	N	-	2.1	-		
			P	-	1.7	-		
Switching								
$t_{d(on)}$	Turn-On Delay Time	N-Channel	N	-	8	16		nS
			P	-	7	14		
t_r	Rise Time	$V_{DD}=15, V_{GS}=10\text{V}$ I _D =1A, R _{GEN} =6Ω	N	-	5	10		
			P	-	13	24		
$t_{d(off)}$	Turn-Off Delay Time	P-Channel $V_{DD}=-15, V_{GS}=-10\text{V}$ I _D =-1A, R _{GEN} =6Ω	N	-	23	37		
			P	-	14	25		
t_f	Fall-Time		N	-	3	6		
			P	-	9	17		

Note 3: Pulse test: $PW \leq 300\mu\text{s}$ duty cycle $\leq 2\%$.

Note 4: Guaranteed by design, not subject to production testing.

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■ Typical Performance Characteristics (N-Channel)

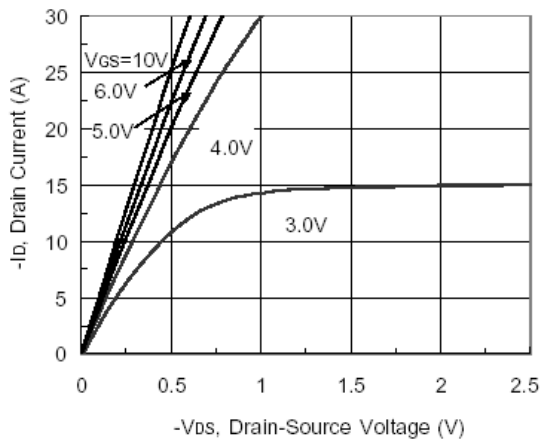


Figure 1. On-Region Characteristics

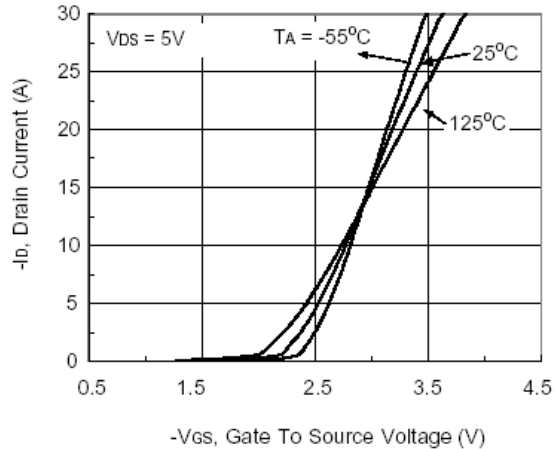


Figure 2. Body Diode Forward Voltage Variation with Source Current and Temperature

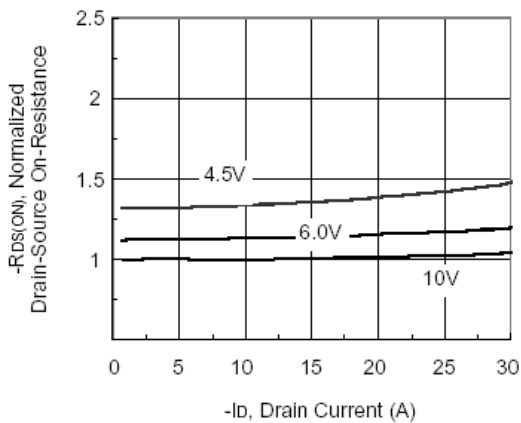


Figure 3. On Resistance v.s. V_{GS} Voltage

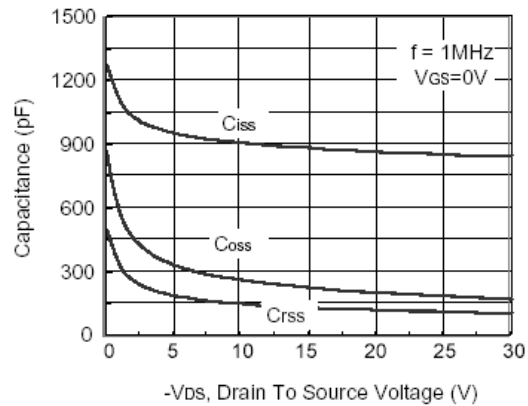


Figure 4. Capacitance Characteristics

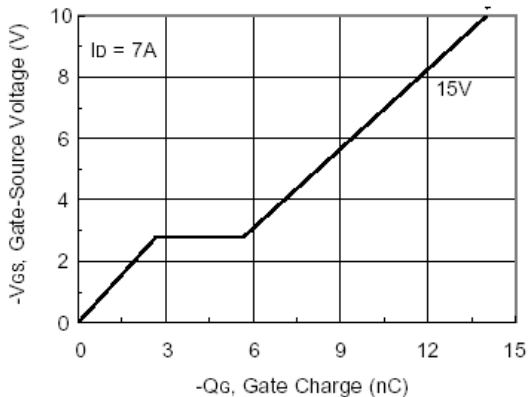


Figure 5. Gate Charge Characteristics

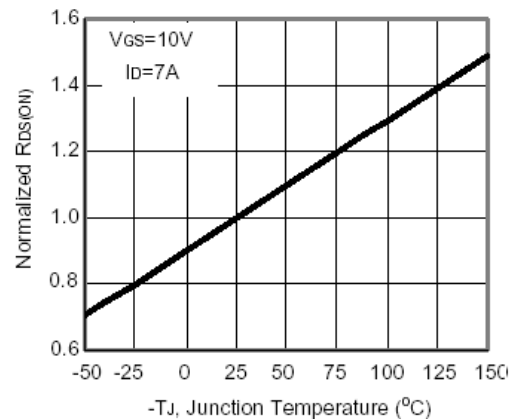


Figure 6. On-Resistance Variation with Temperature

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■ Typical Performance Characteristics (N-Channel) (Continued)

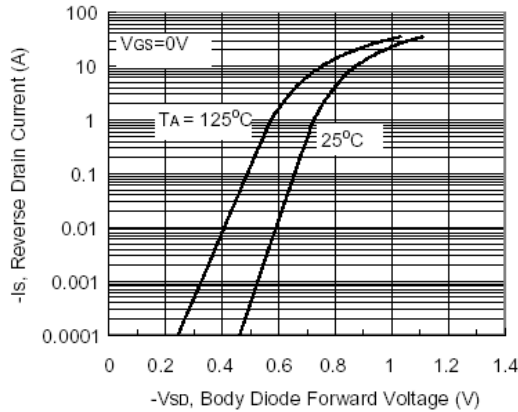


Figure 7. Transfer Characteristics

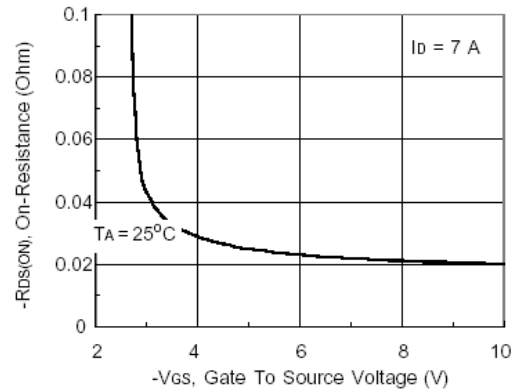


Figure 8. On-Resistance with Gate to Source Voltage

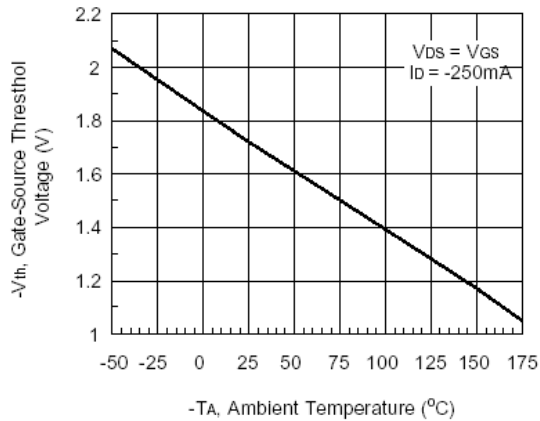


Figure 9. Vth Gate to Source Voltage Vs Temperature

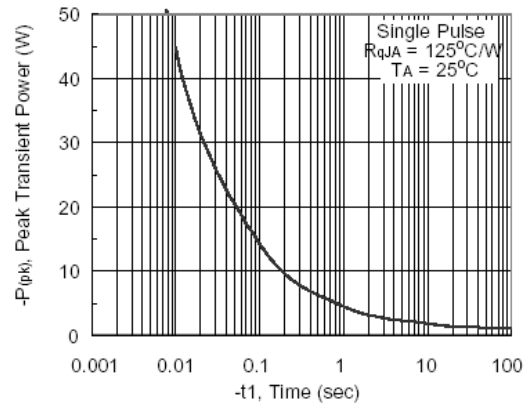


Figure 10. Single Pulse Maximum Power Dissipation

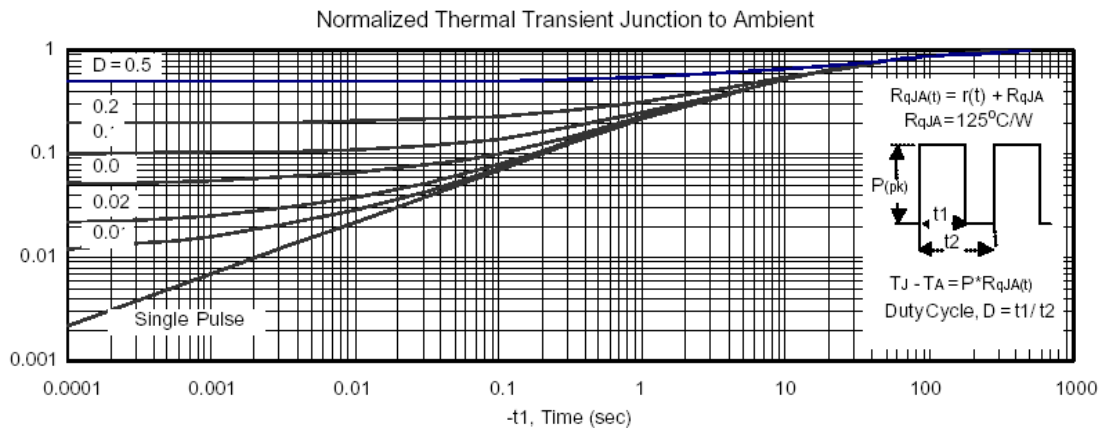


Figure 11. Transient Thermal Response Curve

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■ Typical Performance Characteristics (P-Channel)

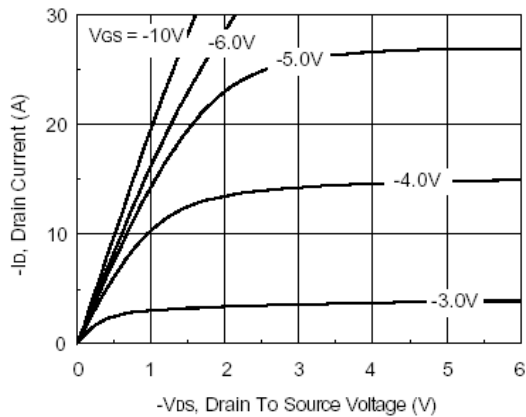


Figure 1. On-Region Characteristics

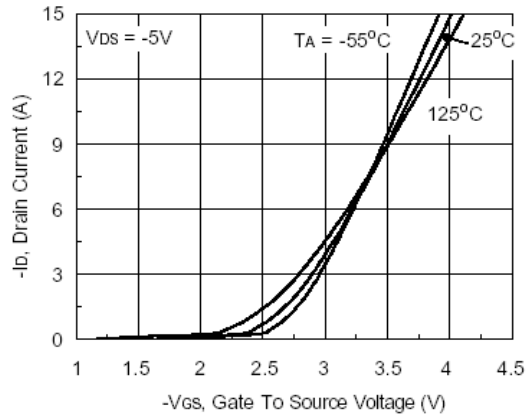


Figure 2. Body Diode Forward Voltage Variation with Source Current and Temperature

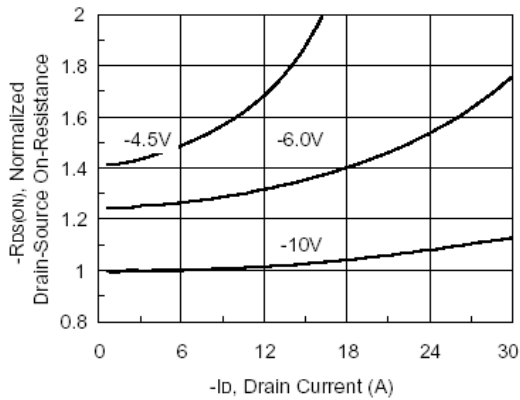


Figure 3. On Resistance Vs Vgs Voltage

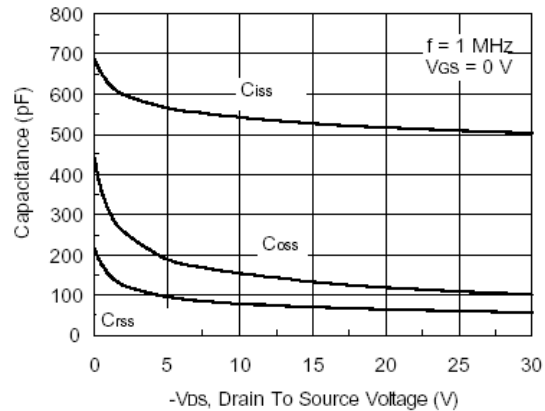


Figure 4. Capacitance Characteristics

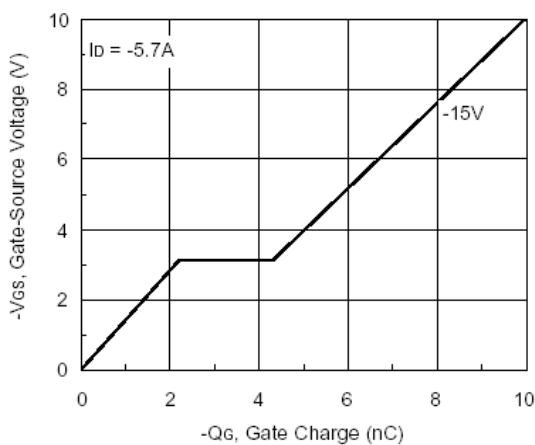


Figure 5. Gate Charge Characteristics

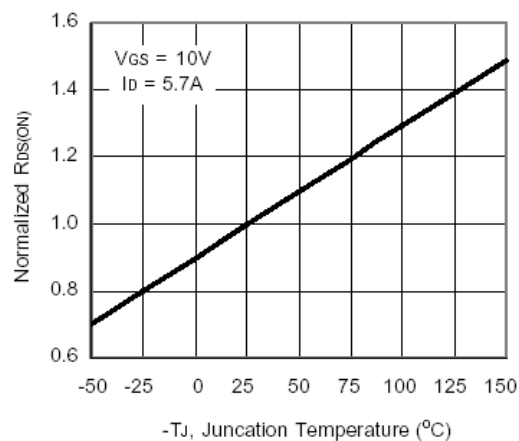


Figure 6. On-Resistance Variation with Temperature

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■ Typical Performance Characteristics (P-Channel) (Continued)

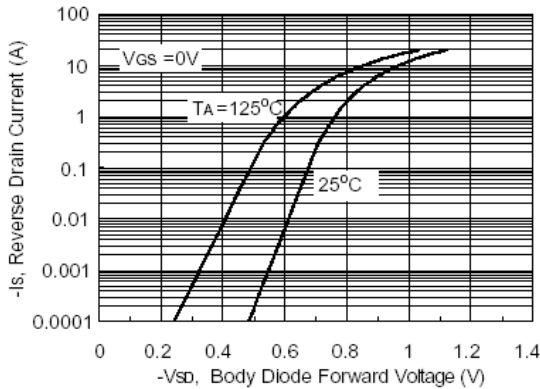


Figure 7. Transfer Characteristics

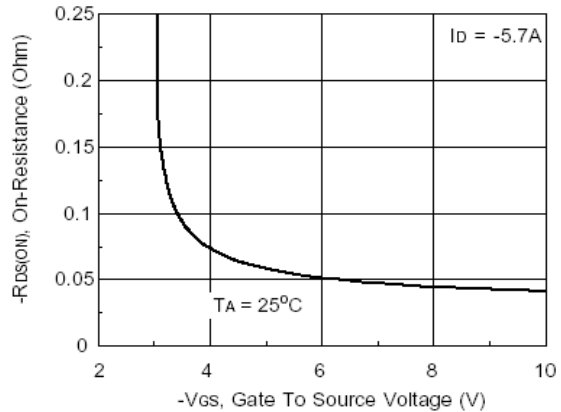


Figure 8. On-Resistance with Gate to Source Voltage

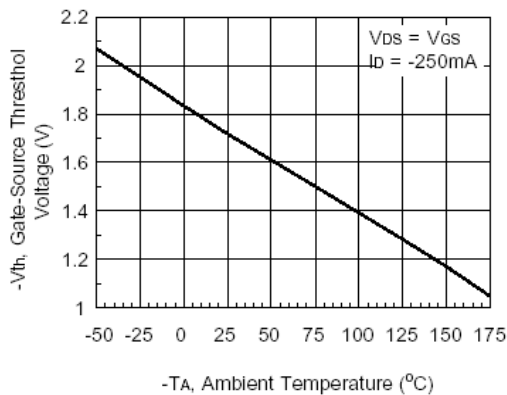


Figure 9. Vth Gate to Source Voltage v.s. Temperature

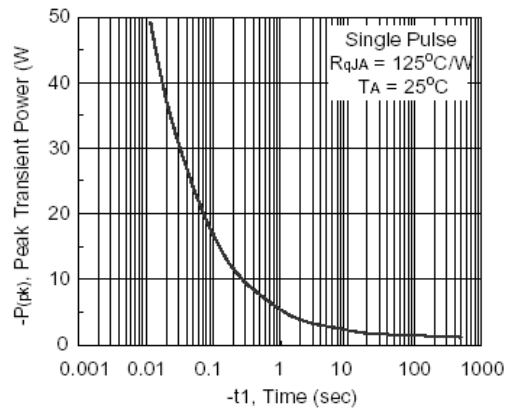


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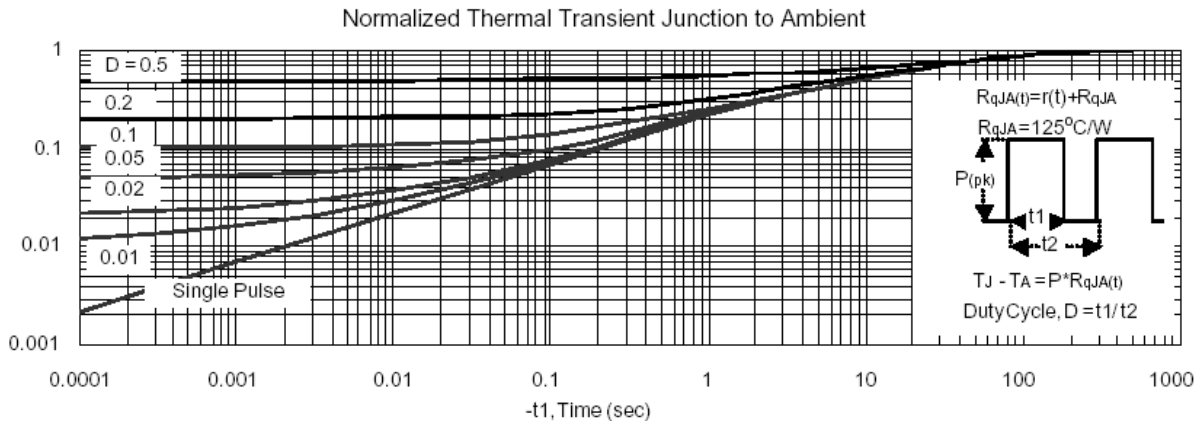
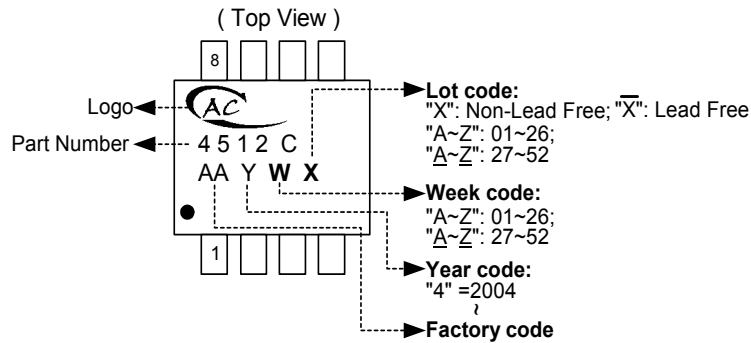


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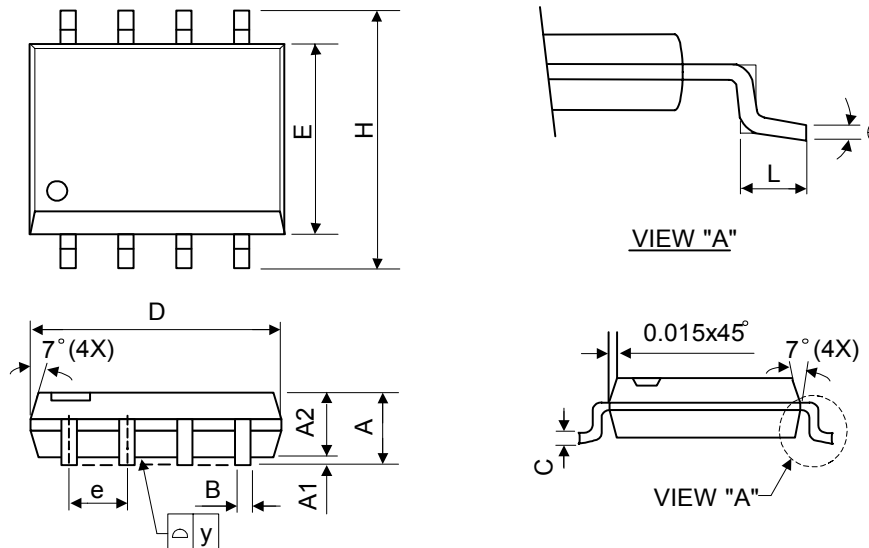
■ Marking Information

SOP-8L



■ Package Information

Package Type: SOP-8L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.40	1.60	1.75	0.055	0.063	0.069
A1	0.10	-	0.25	0.040	-	0.100
A2	1.30	1.45	1.50	0.051	0.057	0.059
B	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.010
D	4.80	5.05	5.30	0.189	0.199	0.209
E	3.70	3.90	4.10	0.146	0.154	0.161
e	-	1.27	-	-	0.050	-
H	5.79	5.99	6.20	0.228	0.236	0.244
L	0.38	0.71	1.27	0.015	0.028	0.050
y	-	-	0.10	-	-	0.004
θ	0°	-	8°	0°	-	8°