AF4502C

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

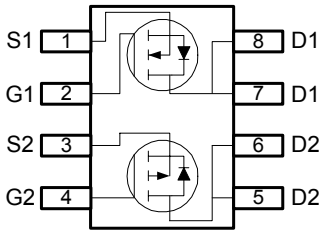
■ General Description

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)	$r_{DS(on)}$ (mΩ)	I_D (A)
30	20@V_{GS}=4.5V	8.4
	13.5@V_{GS}=10V	10.0
-30	30@V_{GS}=-4.5V	-6.8
	19@V_{GS}=-10V	-8.5

■ Pin Assignments

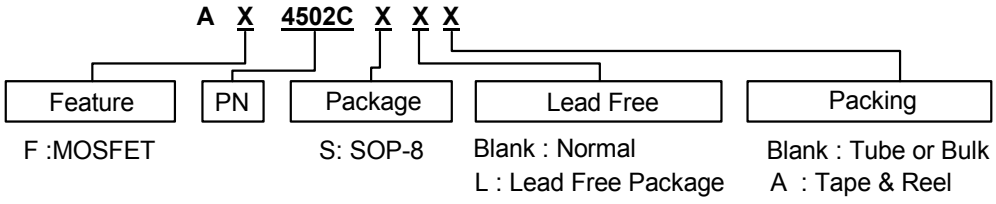


SOP-8

■ 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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P & N-Channel 30-V (D-S) MOSFET

■ Absolute Maximum Ratings (T_A=25ºC unless otherwise noted)

Symbol	Parameter		N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage		30	-30	V
V_{GS}	Gate-Source Voltage		20	-25	
I_D	Continuous Drain Current **(Note 1)**	T_A=25ºC	10	-8.5	A
		T_A=70ºC	8.1	-6.8	
I_{DM}	Pulsed Drain Current **(Note 2)**		±50	±50	A
I_S	Continuous Source Current (Diode Conduction) **(Note 1)**		2.3	-2.1	A
P_D	Power Dissipation **(Note 1)**	T_A=25ºC	2.1	2.1	W
		T_A=70ºC	1.3	1.3	
T_J, T_{STG}	Operating Junction and Storage Temperature Range		-	-55 to 150	ºC

■ Thermal Resistance Ratings

Symbol	Parameter		Maximum	Units
$R_{\theta JC}$	Maximum Junction-to-Case **(Note 1)**	t ≤ 5 sec	40	ºC/W
$R_{\theta JA}$	Maximum Junction-to-Ambient **(Note 1)**	t ≤ 5 sec	60	ºC/W

Note 1: surface Mounted on 1"x 1" FR4 Board.
Note 2: Pulse width limited by maximum junction temperature

■ Specifications (T_A=25ºC 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=250uA	N	30	-	-	V
		V_{GS}=0V, I_D=-250uA	P	-30	-	-	
$V_{GS(th)}$	Gate-Threshold Voltage	V_{DS}= V_{GS}, I_D=250uA	N	1	1.95	3	V
		V_{DS}= V_{GS}, I_D=-250uA	P	-1.0	-1.6	-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	-50	-	-	
$r_{DS(on)}$	Drain-Source On-Resistance **(Note 3)**	V_{GS}=10V, I_D=10A	N	-	11	13.5	mΩ
		V_{GS}=4.5V, I_D=8.4A		-	15	20	
		V_{GS}=-10V, I_D=-8.5A	P	-	16	19	
		V_{GS}=-4.5V, I_D=-6.8A		-	26	30	
g_{fs}	Forward Tranconductance **(Note 3)**	V_{DS}=15V, I_D=10A	N	-	40	-	S
		V_{DS}=-15V, I_D=-9.5A	P	-	31	-	

■ Specifications (T_A=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Limits				Unit
			Ch	Min.	Typ.	Max.	
Dynamic							
Q_g	Total Gate Charge	N-Channel V_{DS}=15V, V_{GS}=4.5V I_D=10A P-Channel V_{DS}=-15V, V_{GS}=-4.5V I_D=-10A	N	-	12	19	nC
			P	-	13	26	
Q_{gs}	Gate-Source Charge		N	-	3.3	-	
			P	-	5.8	-	
Q_{gd}	Gate-Drain Charge		N	-	4.5	-	
			P	-	12	-	
Switching							
$t_{d(on)}$	Turn-On Delay Time	N-Channel V_{DD}=15, V_{GS}=10V I_D=1A, R_{GEN}=25Ω P-Channel V_{DD}=-15, V_{GS}=-10V I_D=-1A, R_{GEN}=15Ω	N	-	20	30	nS
			P	-	15	26	
t_r	Rise Time		N	-	9	20	
			P	-	16	21	
$t_{d(off)}$	Turn-Off Delay Time		N	-	70	102	
			P	-	62	108	
t_f	Fall-Time		N	-	20	81	
			P		46	71	

Note 3: Pulse test: PW ≤ 300us duty cycle ≤ 2%.
Note 4: Guaranteed by design, not subject to production testing.

■ Typical Performance Characteristics

Typical Electrical Characteristics (P-Channel)

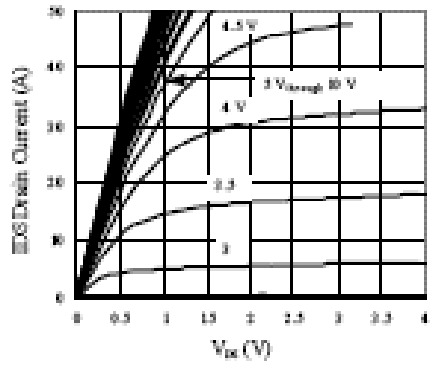


Figure 1. On-Region Characteristics

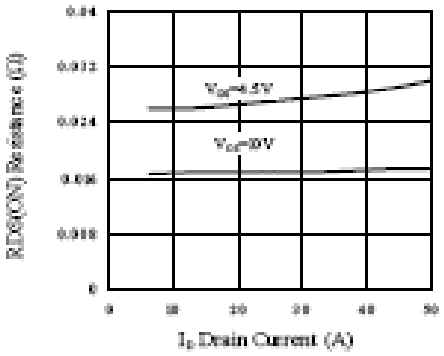


Figure 2. On-Resistance with Drain Current

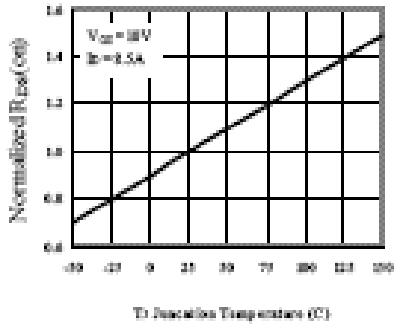


Figure 3. On-Resistance Variation with Temperature

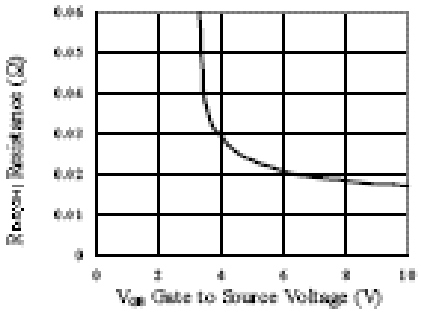


Figure 4. On-Resistance Variation with Gate to Source Voltage

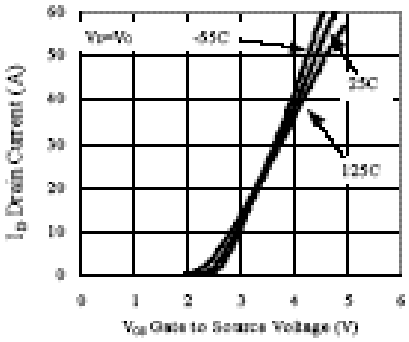


Figure 5. Transfer Characteristics

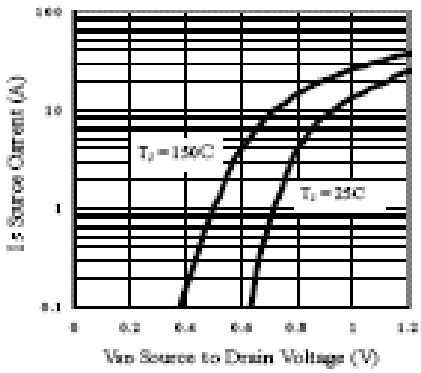
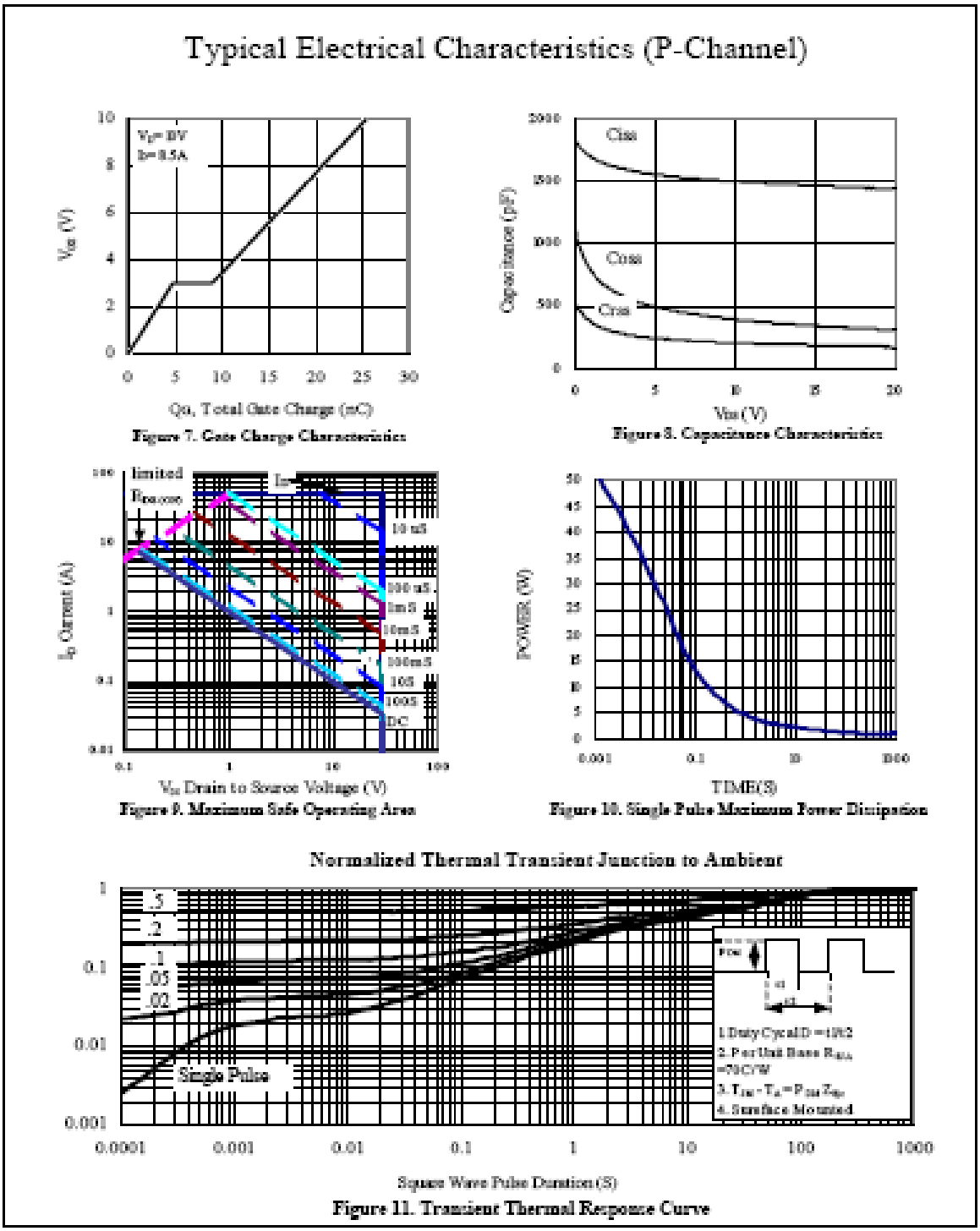


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

■ Typical Performance Characteristics (Continued)



■ Typical Performance Characteristics (Continued)

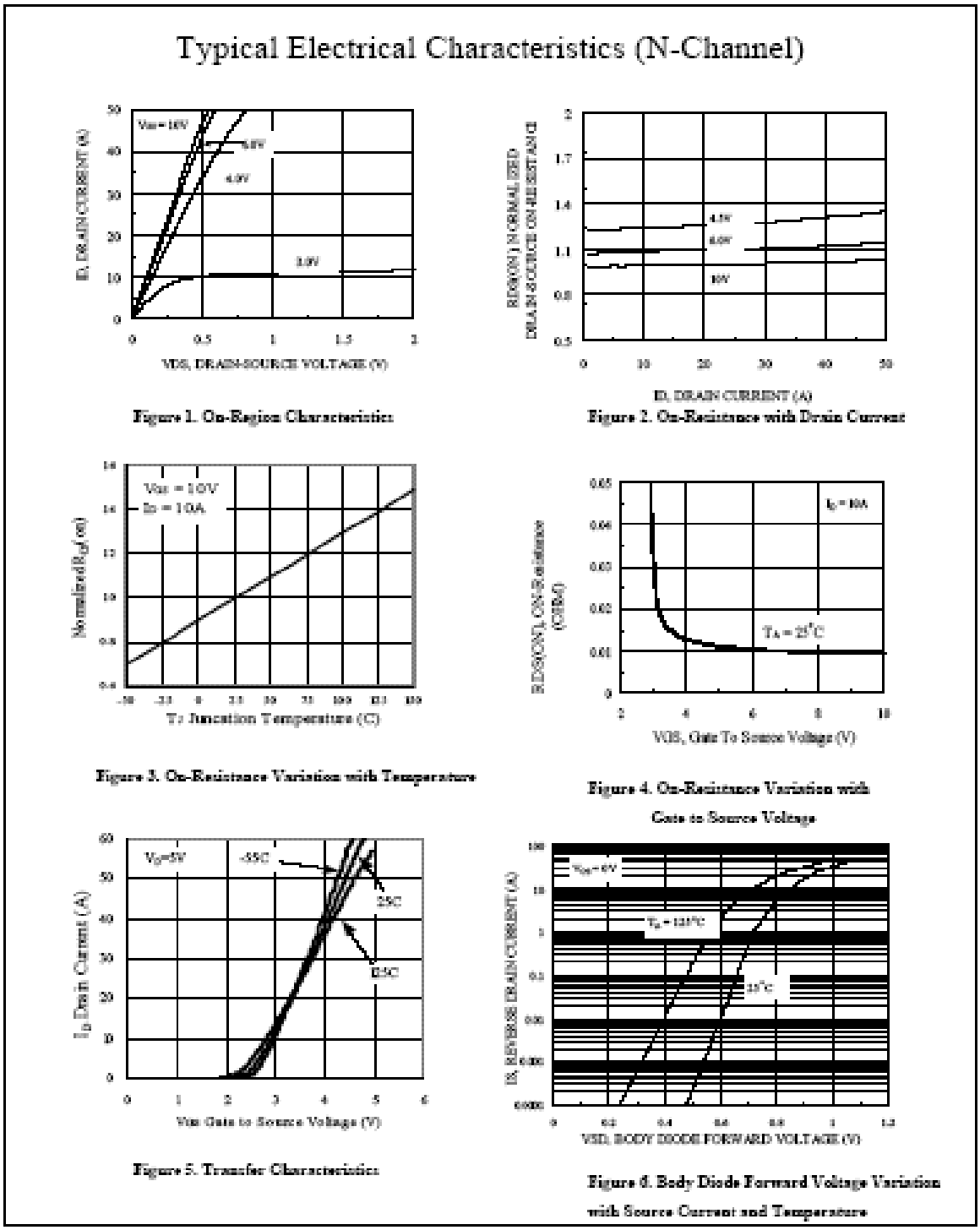


Figure 1. On-Region Characteristics

Figure 2. On-Resistance with Drain Current

Figure 3. On-Resistance Variation with Temperature

Figure 4. On-Resistance Variation with Gate to Source Voltage

Figure 5. Transfer Characteristics

Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

■ Typical Performance Characteristics (Continued)

Typical Electrical Characteristics (N-Channel)

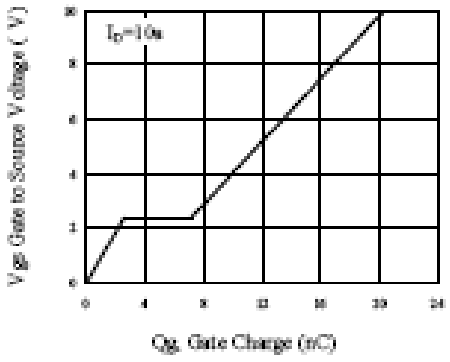


Figure 7. Gate Charge Characteristics

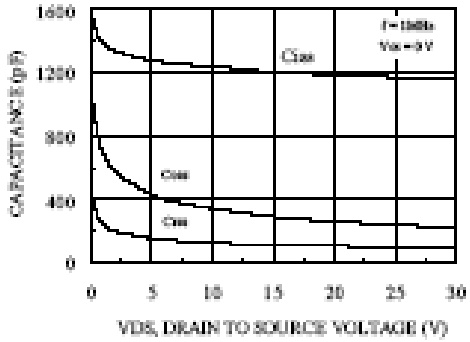


Figure 8. Capacitance Characteristics

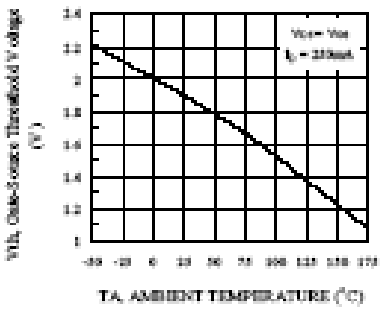


Figure 9. Threshold Vs Ambient Temperature

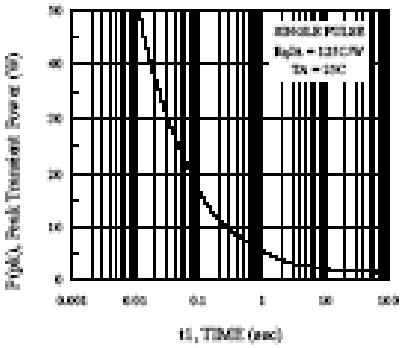


Figure 10. Single Pulse Maximum Power Dissipation

Normalized Thermal Transient Junction to Ambient

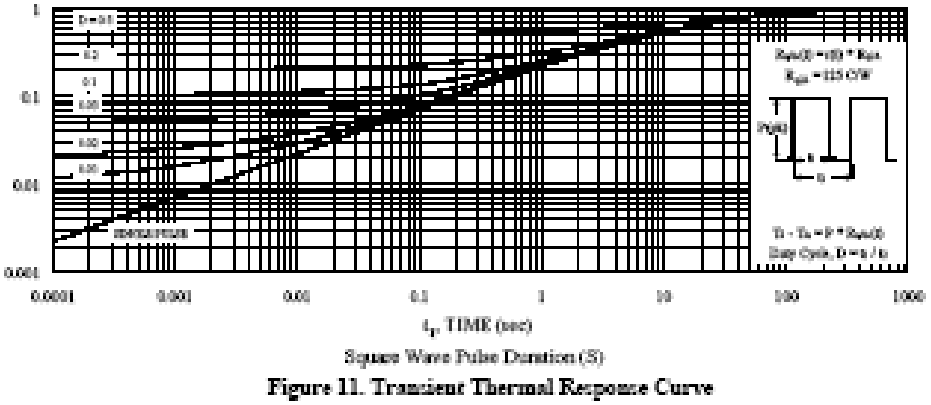
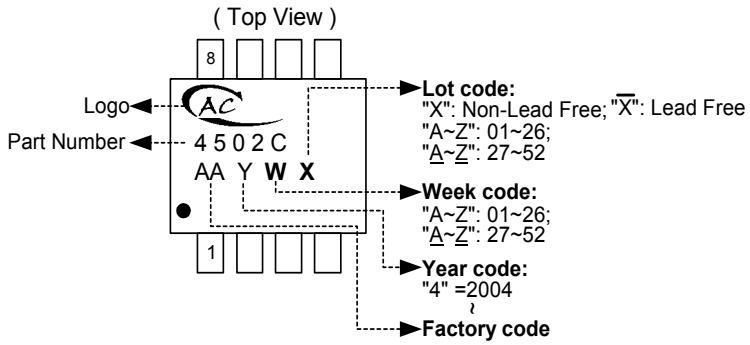


Figure 11. Transient Thermal Response Curve

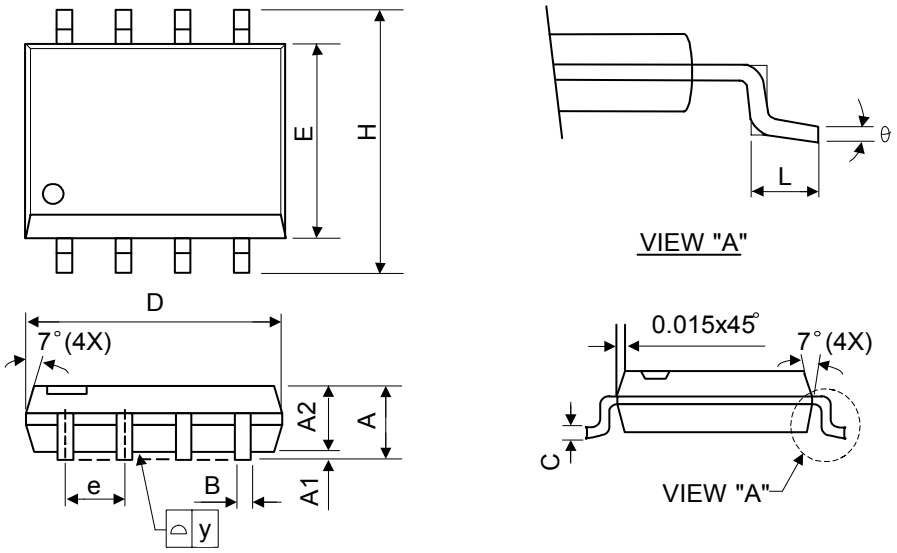
■ Marking Information

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^{O}	-	8^{O}	0^{O}	-	8^{O}