P & N-Channel 60-V(D-S) MOSFET

◆ 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 PWM DC-DC converters, power management in portable and battery-powered products such as computers, printers, battery charger, telecommunication power system, and telephones power system.

◆ FEATURES

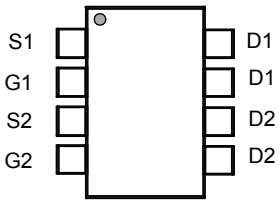
- 60V/4.5A, $R_{DS(ON)}$ = 58mΩ @ V_{GS} = 10V
- 60V/4.0A, $R_{DS(ON)}$ = 85mΩ @ V_{GS} = 4.5V
- -60V/-3.5A, $R_{DS(ON)}$ = 90mΩ @ V_{GS} = -10V
- -60V/-3.0A, $R_{DS(ON)}$ =135mΩ @ V_{GS} = -4.5V
- Fast switching speed
- SOP-8 & TO-252 package design

◆ APPLICATIONS

- Power Management in Note
- Portable Equipment
- Battery Powered System
- Load Switch
- LCD Display inverter

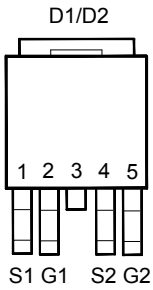
◆ PIN CONFIGURATION

SOP-8

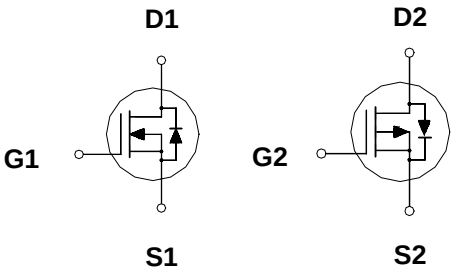


MT4599CM

TO-252



MT4599CB



◆ ABSOLUTE MAXIMUM RATINGS

(T_A=25°C Unless Otherwise Noted)

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	60	-60	V
Gate-Source Voltage		V_{GS}	20	-20	V
Continuous Drain Current[a]	T_A=25°C	I_D	4.5	-3.5	A
	T_A=70°C		4	-3	
Pulsed Drain Current[b]		I_{DM}	20	-20	A
Continuous Source Current (Diode Conduction)[a]		I_S	1.3	-1.3	A
Power Dissipation[a]	T_A=25°C	P_D	2	2	W
	T_A=70°C		1.3	1.3	
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 to 150		°C

◆ THERMAL RESISTANCE RATINGS

Thermal Resistance		Symbol	Maximum	Unit
Maximum Junction-to-Ambient [a]	t<=10sec(SOP-8)	$R_{\theta JA}$	62.5	°C/W
	Steady-State(SOP-8)		110	
	Steady-State(TO-252)		50	
Maximum Junction-to-Case	Steady-State (SOP-8)	$R_{\theta JC}$	40	°C/W
	Steady-State(TO-252)		6	

Note :

a. Surface Mounted on 1” x 1” FR4 Board.

b. Pulse width limited by maximum junction temperature

◆ ORDERING INFORMATION

Device	Package	Shipping
MT4599CM	SOP-8	2,500 Units/ Tape & Reel
MT4599CM	SOP-8	100 Units/ Tube
MT4599CB	TO-252	2,500 Units/ Tape & Reel

◆ ELECTRICAL CHARACTERISTICS

(T_A=25°C Unless Otherwise Noted)

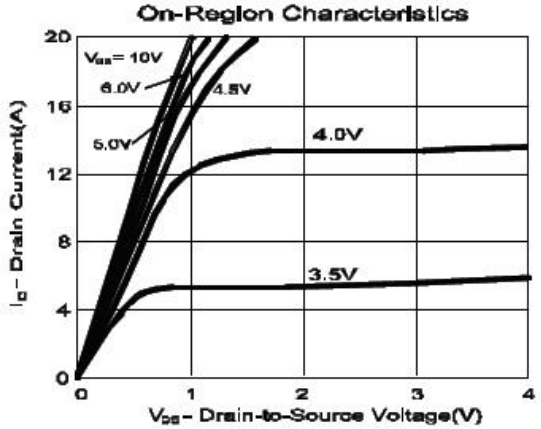
Parameter	Symbol	Test Conditions	Limits				Unit
			Ch	Min	Typ	Max	
Static							
Gate-Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = 250 uA	N	1	1.5	2.5	V
		V_{GS} = V_{DS}, I_D = -250 uA	P	-1	-1.5	-2.5	
Gate-Body Leakage	I_{GSS}	V_{GS} = -20 V, V_{DS} = 0 V	P	-	-	±100	nA
		V_{GS} = 20 V, V_{DS} = 0 V	N	-	-	±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}= -48 V, V_{GS}= 0 V	P	-	-	-1	uA
		V_{DS} = 48 V, V_{GS} = 0 V	N	-	-	1	
On-State Drain Current[A]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	N	20	-	-	A
		V_{DS} = -5 V, V_{GS} = -10 V	P	-20	-	-	
Drain-Source On-Resistance[A]	$R_{DS(on)}$	V_{GS}= 10 V, I_D= 4.5 A	N	-	40	58	mΩ
		V_{GS}= 4.5 V, I_D= 4 A		-	55	85	
		V_{GS}= -10 V, I_D= -3.5 A	P	-	70	90	
		V_{GS}= -4.5 V, I_D= -3 A		-	100	135	
Forward Tranconductance[A]	g_{fs}	V_{DS}= 10 V, I_D=4.5A	N	-	14	-	S
		V_{DS}= -5 V, I_D= -3.5 A	P	-	9	-	
Dynamic							
Total Gate Charge	Q_g	N-Channel V_{DS}=0.5V, V_{GS}=10V, I_D=4.5A P-Channel V_{DS}=-0.5V, V_{GS}=-10V, I_D=-3.5A	N	-	12	-	nC
			P	-	11	-	
Gate-Source Charge	Q_{gs}		N	-	2.4	-	
			P	-	2.1	-	
Gate-Drain Charge	Q_{gd}		N	-	2.6	-	
			P	-	2.5	-	
Turn-On Delay Time	$t_{d(on)}$	N-Channel V_{DD}=30V, V_{GS}=10V, I_D=1A , R_{GEN}=6Ω, P-Channel V_{DD}=-30V, V_{GS}=-10V, I_D=-1A ,R_{GEN}=6Ω	N	-	11	-	nS
			P	-	6	-	
Rise Time	t_r		N	-	8	-	
			P	-	8	-	
Turn-Off Delay Time	$t_{d(off)}$		N	-	19	-	
			P	-	17	-	
Fall-Time	t_f		N	-	6	-	
			P	-	11	-	

Note :

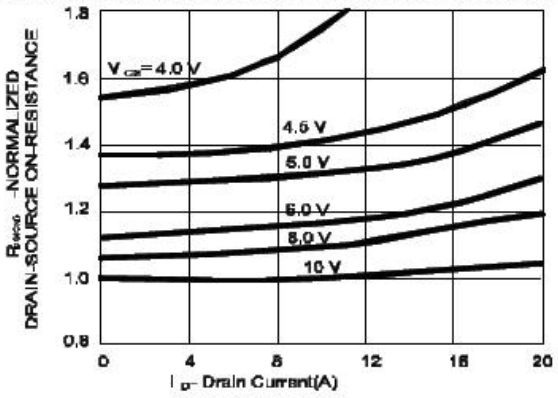
A . Pulse test: PW<=300us duty cycle <=2%

◆ TYPICAL CHARACTERICTICS (N-Channel)

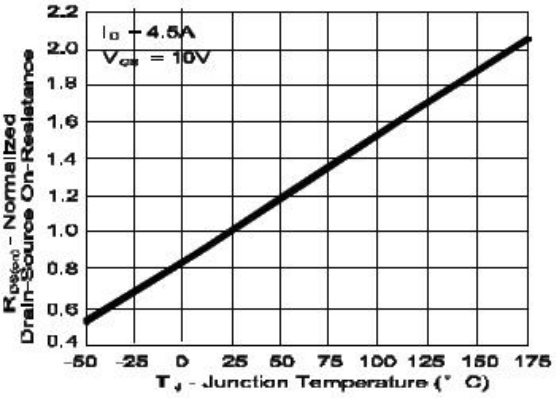
On-Region Characteristics



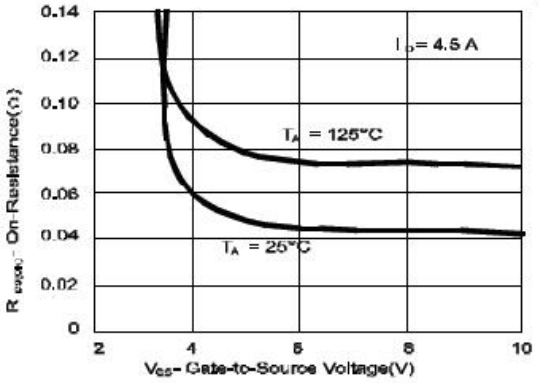
On-Resistance Variation with Drain Current and Gate Voltage



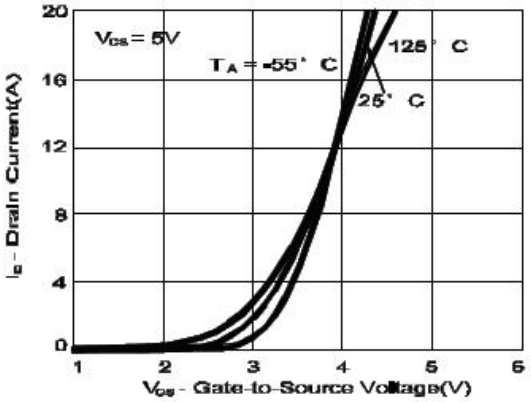
On-Resistance Variation with Temperature



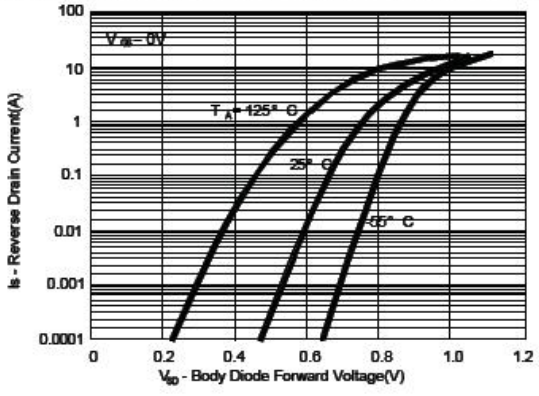
On-Resistance Variation with Gate-to-Source Voltage



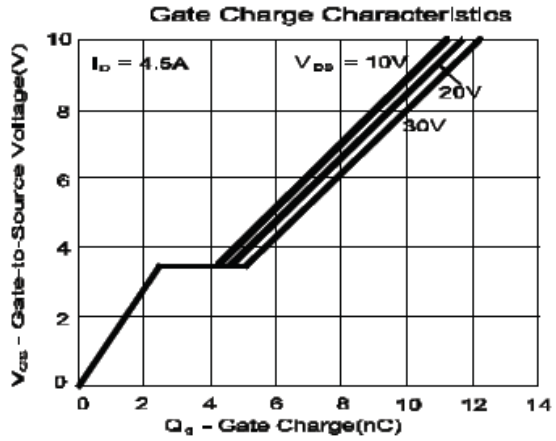
Transfer Characteristics

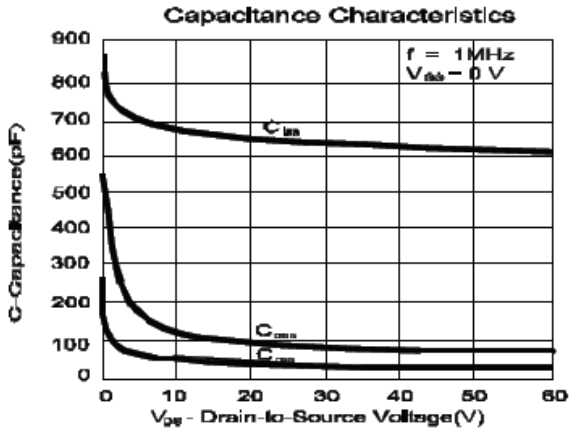


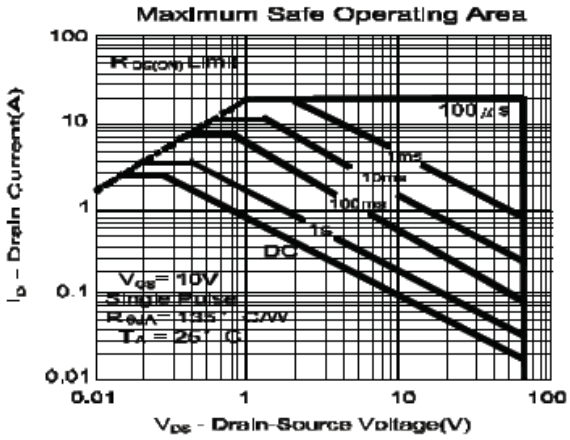
Body Diode Forward Voltage Variation with Source Current and Temperature

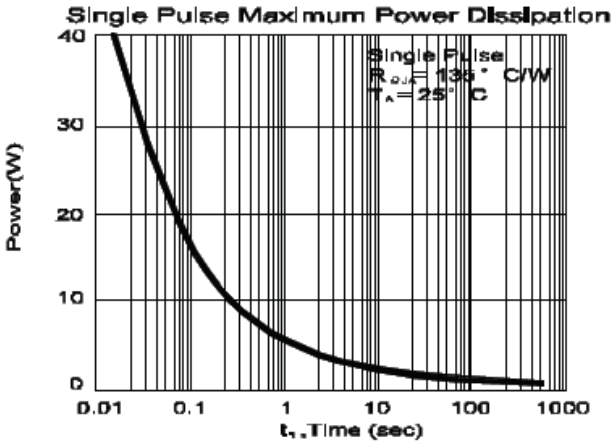


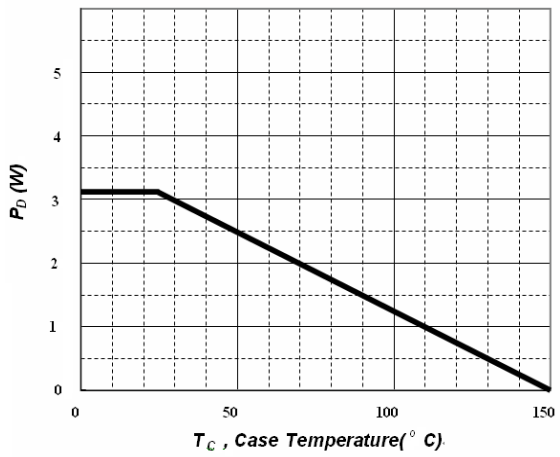
◆ TYPICAL CHARACTERICTICS (N-Channel)



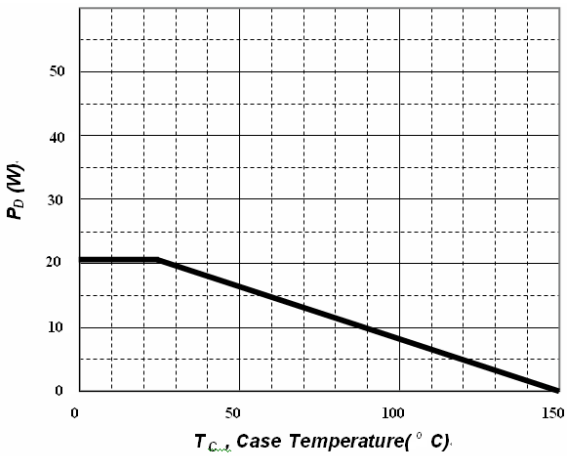








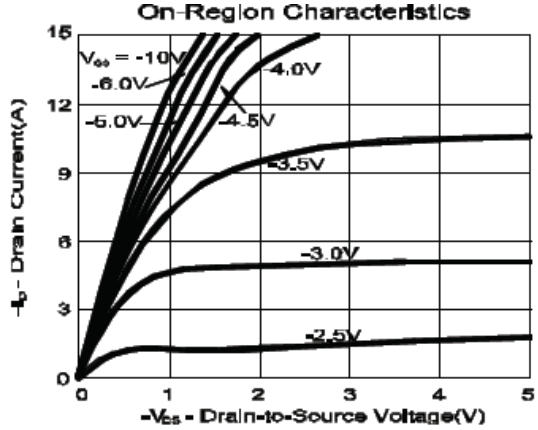
SOP-8 package N-channel Power Dissipation (P_D vs. T_C)



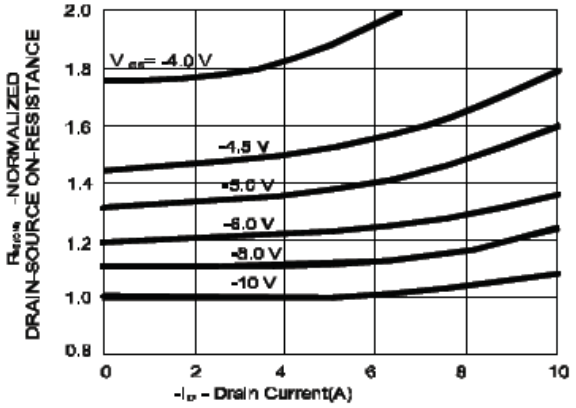
TO-252 package N-channel Power Dissipation (P_D vs. T_C)

◆ TYPICAL CHARACTERICTICS (P-Channel)

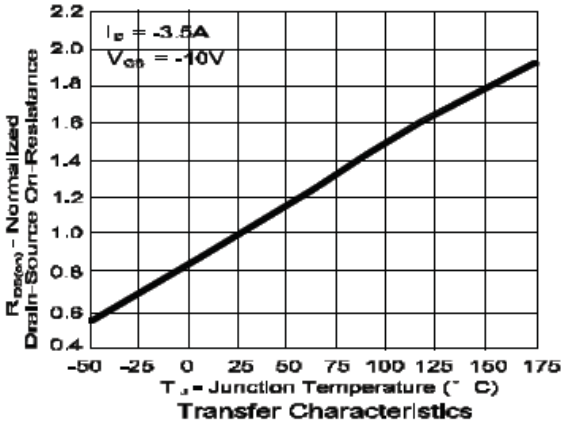
On-Region Characteristics



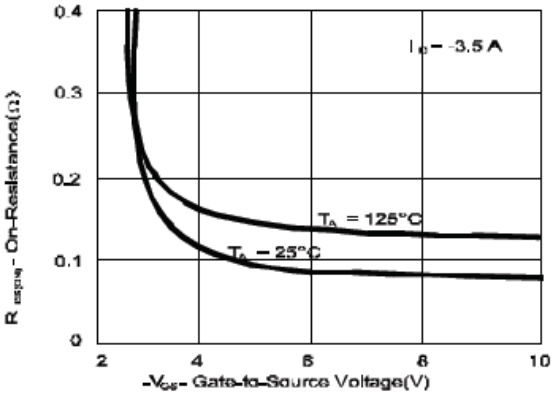
On-Resistance Variation with Drain Current and Gate Voltage



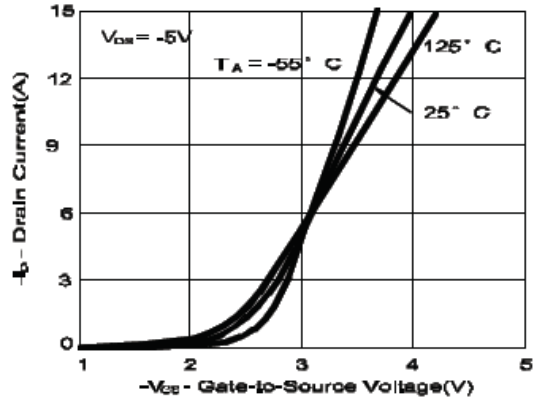
On-Resistance Variation with Temperature



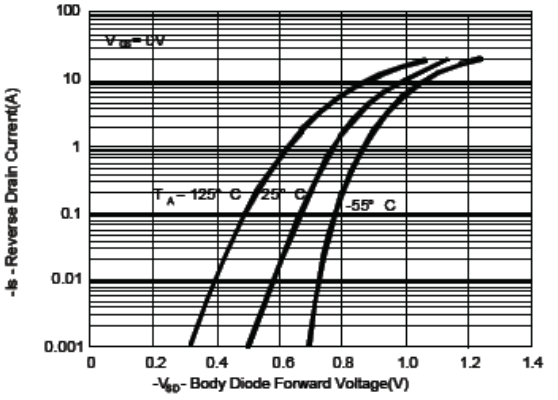
On-Resistance Variation with Gate-to-Source Voltage



Transfer Characteristics

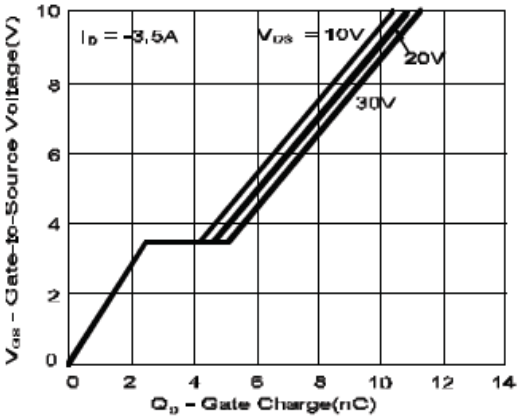


Body Diode Forward Voltage Variation with Source Current and Temperature

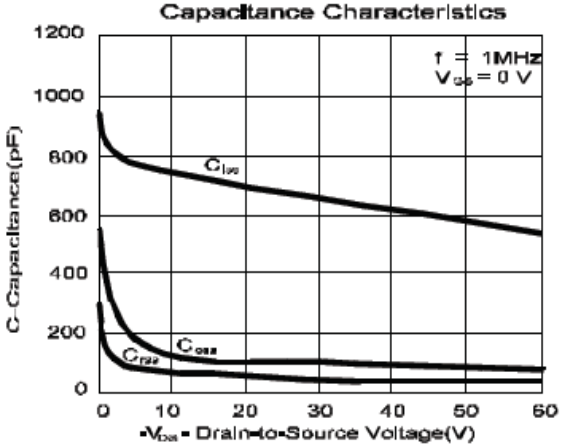


◆ TYPICAL CHARACTERICTICS (P-Channel)

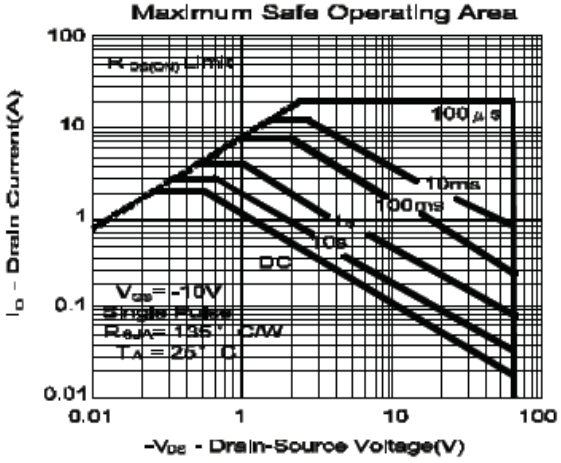
Gate Charge Characteristics



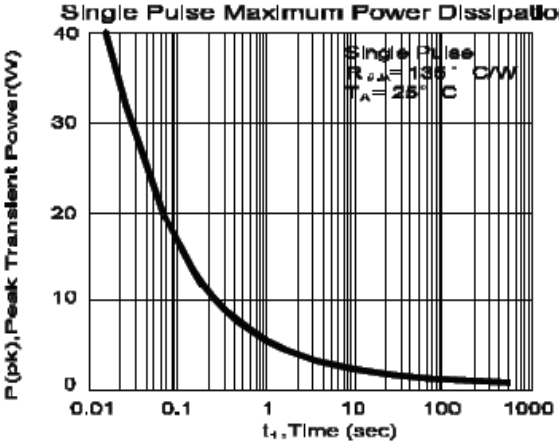
Capacitance Characteristics



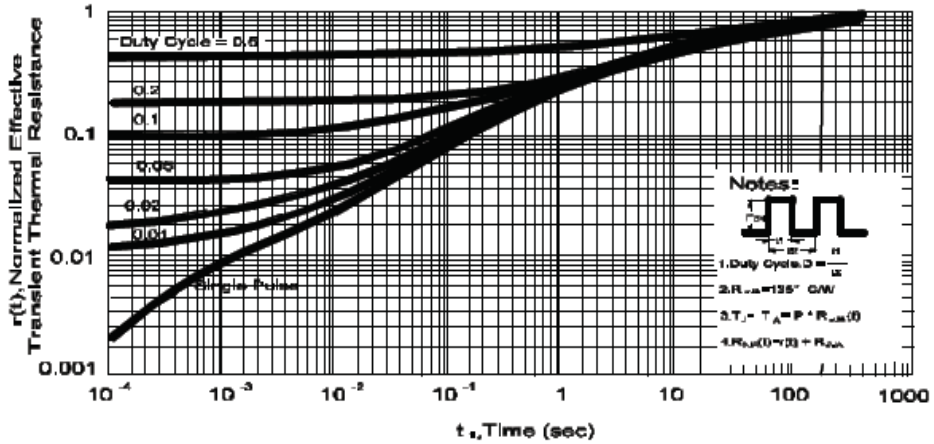
Maximum Safe Operating Area



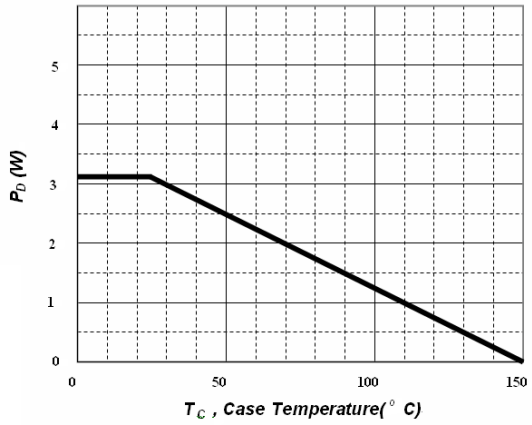
Single Pulse Maximum Power Dissipation



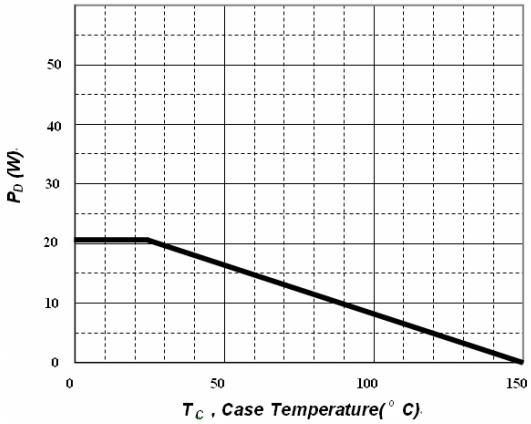
Transient Thermal Response Curve



◆ TYPICAL CHARACTERICTICS (P-Channel)



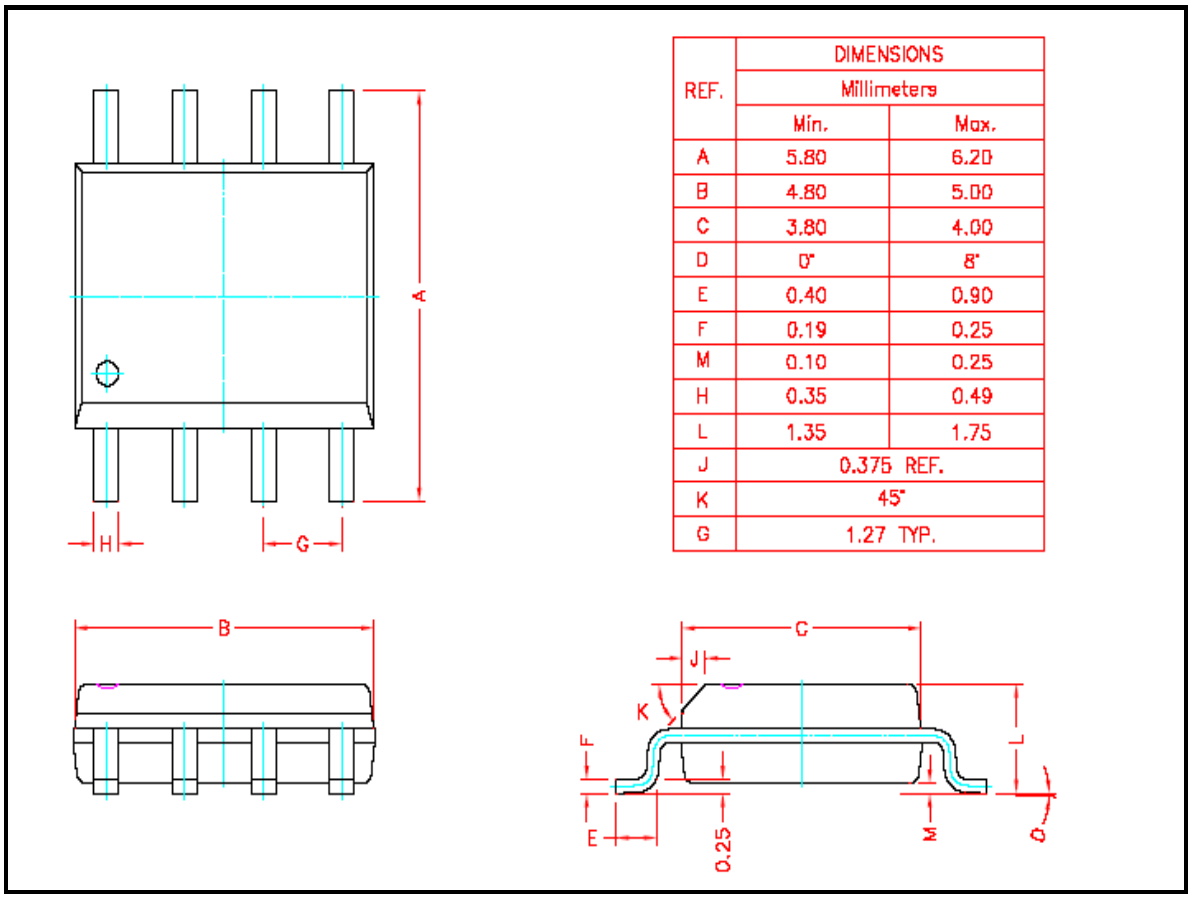
SOP-8 package P-channel Power Dissipation (P_D vs. T_C)



TO-252 package P-channel Power Dissipation (P_D vs. T_C)

◆ PHYSICAL DIMENSIONS

8-Pin Plastic S.O.I.C.



REF.	DIMENSIONS	
	Millimeters	
	Min.	Max.
A	5.80	6.20
B	4.80	5.00
C	3.80	4.00
D	0°	8°
E	0.40	0.90
F	0.19	0.25
M	0.10	0.25
H	0.35	0.49
L	1.35	1.75
J	0.375 REF.	
K	45°	
G	1.27 TYP.	

◆ PHYSICAL DIMENSIONS

5-Pin Plastic TO-252(DPAK)

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	9.0		10.4	J	4.8		5.46
B	2.1	2.3	2.5	L	0.44		0.68
C	0.4	0.5	0.6	M	1.1	1.3	1.5
E		0.508		S	5.2		5.515
F			0.3	T	4.4		5.004
G	5.3		6.223	U	1.4	1.52	1.77
H	0.89		1.7	V	0.9	1.2	1.5
I	6.3		6.731