N and P Channel 30V MOSFET

GENERAL DESCRIPTION

The JY12M is the N and P Channel logic enhancement mode power field transistors are produced using high cell density DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application such as cellular phone and notebook computer power management and other battery powered circuits where high-side switching, and low in-line power loss are needed in a very small outline surface mount package.

FEATURES

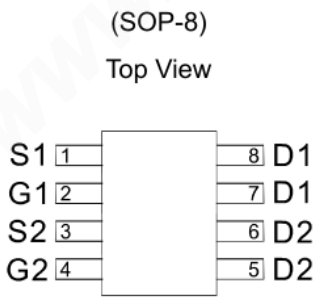
Device	$R_{DS(ON)\ MAX}$	$I_{DMAX}(25^{o}C)$
N-Channel	20mΩ@V_{GS}=10V	8.5A
	32mΩ@V_{GS}=4.5V	7.0A
P-Channel	45mΩ@V_{GS}=-10V	-5.5A
	85mΩ@V_{GS}=-4.5V	-4.1A

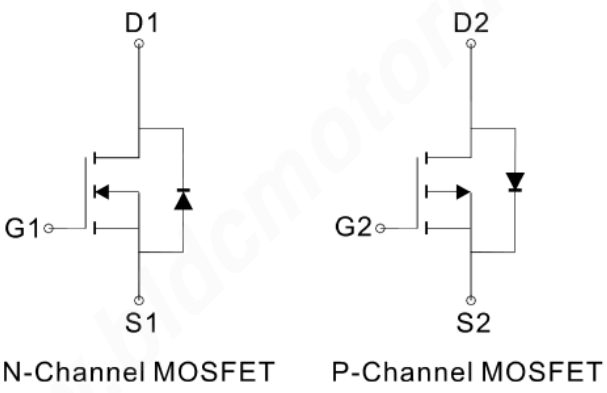
- Low Input Capacitance
- Fast Switching Speed

APPLICATIONS

- Power Management
- DC/DC Converter
- DC Motor Control
- LCD TV & Monitor Display Inverter
- CCFL inverter

PIN CONFIGURATION





Absolute Maximum Ratings(Ta=25° C Unless Otherwise Noted)

Parameter		Symbol	N Channel		P Channel		Unit
			10 sec	Steady	10 sec	Steady	
Drain Source Voltage		V_{DSS}	30		-30		V
Gate Source Voltage		V_{DSS}	±20		±20		
Continuous Drain Current	Ta=25 ºC	I_D	8.5	6.5	-7.0	-5.3	A
	Ta=70 ºC		6.8	5.1	-5.5	-4.1	
Pulsed Drain Current		I_{DM}	30		-30		
Maximum Power Dissipation	Ta=25 ºC	P_D	1.5				W
	Ta=70 ºC		0.95				
Operating Junction Temperature		T_J	-55 to 150				ºC
Thermal Resistance Junction to Ambient		$R_{\theta JA}$	61	100	62	103	ºC/W
Thermal Resistance Junction to Case		$R_{\theta JC}$	15		15		ºC/W

Electrical Characteristics(Ta=25° C Unless Otherwise Noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static							
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	N-Ch	1.0	1.5	3.0	V
		V_{DS}=V_{GS},I_D=-250uA	P-Ch	-1.0	-1.5	-3.0	
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±20V	N-Ch			±100	nA
			P-Ch			±100	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V	N-Ch			1	uA
		V_{DS}=-30V, V_{GS}=0V	P-Ch			-1	
$I_{D(ON)}$	On-State Drain Current	V_{DS}≥5V, V_{GS}=10V	N-Ch	20			A
		V_{DS}≤-5V, V_{GS}=-10V	P-Ch	-20			
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V,I_D=7.4A	N-Ch		15	20	mΩ
		V_{GS}=-10V,I_D=-5.2A	P-Ch		38	45	
		V_{GS}=4.5V,I_D=6.0A	N-Ch		23	32	
		V_{GS}=-4.5V,I_D=-4.0A	P-Ch		65	85	
V_{SD}	Diode Forward Voltage	I_S=1.7A,V_{GS}=0V	N-Ch		0.8	1.2	V
		I_S=-1.7A,V_{GS}=0V	P-Ch		-0.8	-1.2	

Electrical Characteristics(Ta=25ºC Unless Otherwise Noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Dynamic							
Qg	Total Gate Charge	N-Channel V_{DS}=15V,V_{GS}=10V, I_D=10A P-Channel V_{DS}=-15V,V_{GS}=-10V,I_D=-6A	N-Ch		9.8		nC
			P-Ch		10.5		
Qgs	Gate-Source Charge		N-Ch		1.6		
			P-Ch		1.8		
Qgd	Gate-Drain Charge		N-Ch		2.0		
			P-Ch		1.9		
Ciss	Input Capacitance	N-Channel V_{DS}=15V,V_{GS}=0V, f=1MHz P-Channel V_{DS}=-25V,V_{GS}=0V, f=1MHz	N-Ch		501		pF
			P-Ch		590		
Coss	Output Capacitance		N-Ch		72		
			P-Ch		69		
Crss	Reverse Transfer Capacitance		N-Ch		57		
			P-Ch		53		
Rg	Gate Resistance	V_{DS}=0V,V_{GS}=0V, f=1MHz	N-Ch		1.84		Ω
			P-Ch		11		
$_{rr}T_{d(on)}$	Turn-On Delay Time	N-Channel V_{DD}=15V,V_{GS}=10V, R_G=6Ω,I_D=1A P-Channel V_{DD}=-15V,V_{GS}=-10 V, R_G=6Ω,I_D=-1A	N-Ch		3.9		ns
			P-Ch		6.8		
T_r	Turn-On Rise Time		N-Ch		4.2		
			P-Ch		4.9		
$T_{d(off)}$	Turn-Off Delay Time		N-Ch		16.6		
			P-Ch		28.4		
T_f	Turn-Off Fall Time		N-Ch		5.5		
			P-Ch		12.4		
T_{rr}	Reverse Recovery Time	I_F=12A, di/dt=500A/us	N-Ch		5.5		ns
			P-Ch		14		
Q_{rr}	Reverse Recovery Charge		N-Ch		2.6		nC
			P-Ch		11		

*The device mounted on 1in2 FR4 board with 2oz copper.
*Guaranteed by design. Not subject to product testing.

Typical Characteristics(T_J=25° C Noted) N-Channel

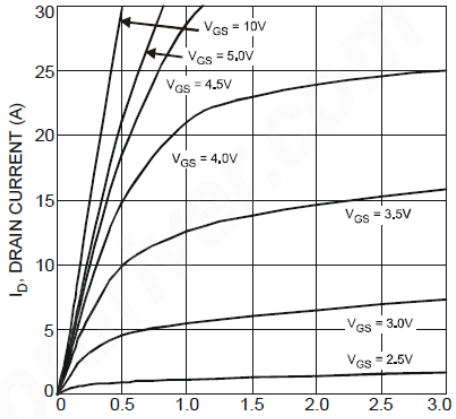


Figure1. Typical Output Characteristic

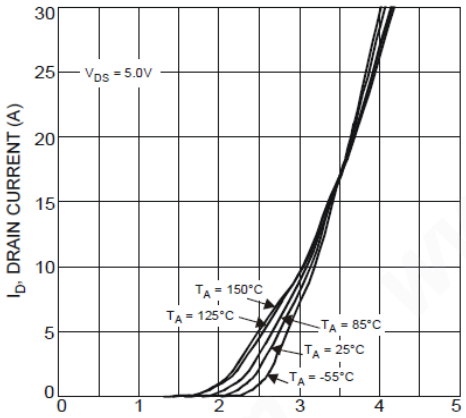


Figure2. Typical Transfer Characteristic

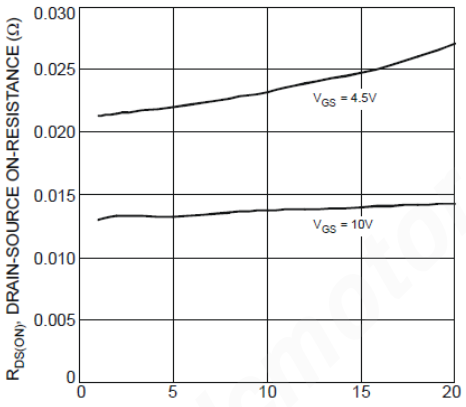


Figure3. Typical On-Resistance vs. Drain Current and Gate Voltage

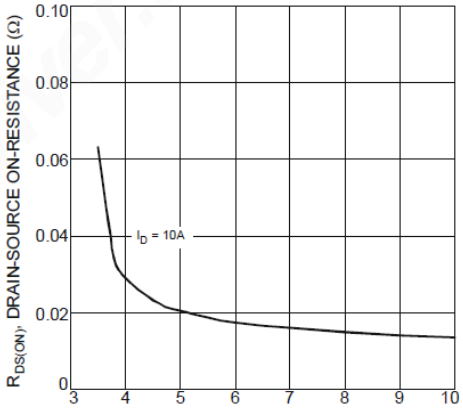


Figure4. Typical On-Resistance vs. Drain Current and Gate Voltage

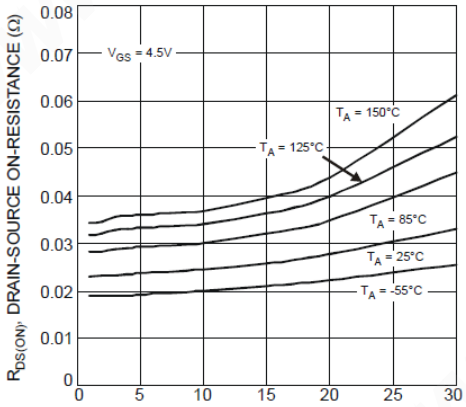


Figure5. Typical On-Resistance vs. Drain Current and Temperature

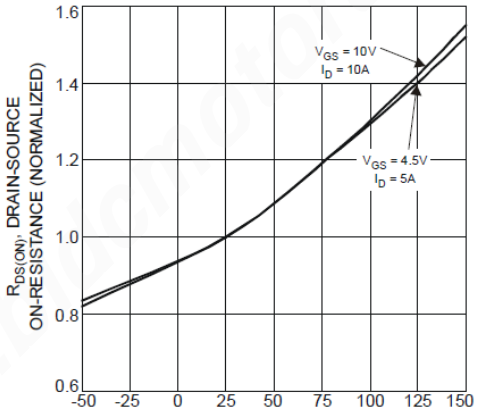
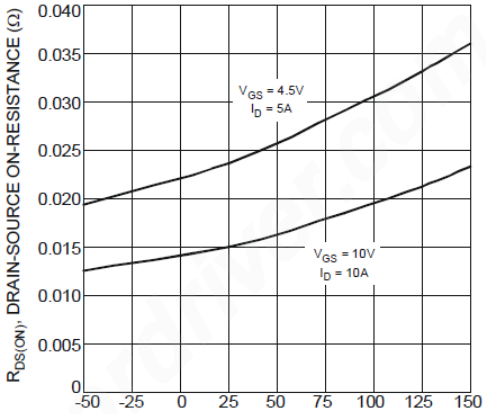


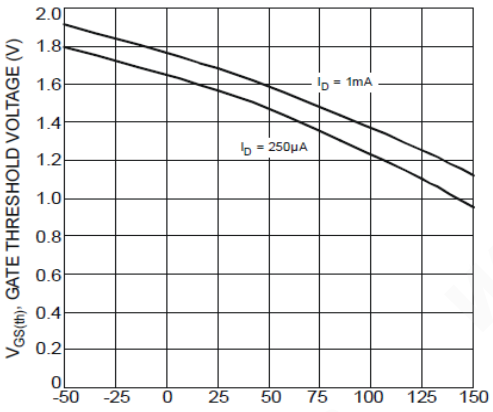
Figure6.On-Resistance Variation with Temperature

Typical Characteristics(T_J=25° C Noted) N-Channel



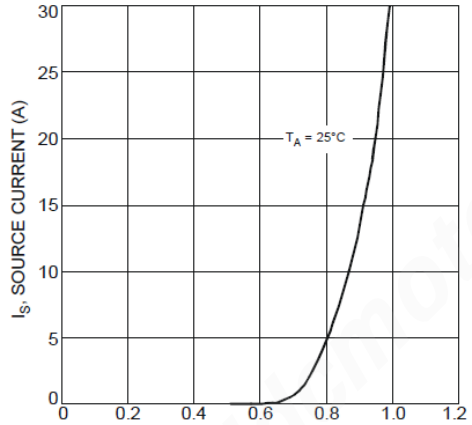
T_J, JUNCTION TEMPERATURE

Figure7.On-Resistance Variation with Temperature



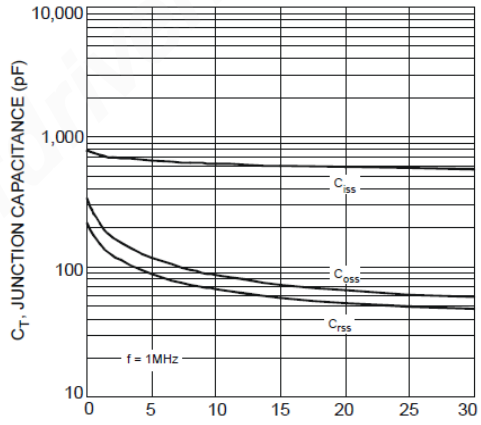
T_J,JUNCTION TEMPERATURE

Figure8. Gate Threshold vs. Ambient Temperature



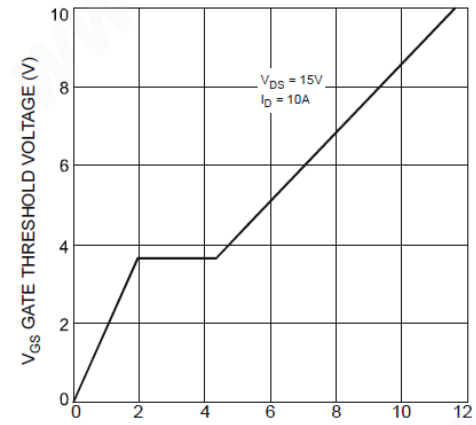
V_{SD}, SOURCE-DRAIN VOLTAGE

Figure9.Diode Forward Voltage vs. Current



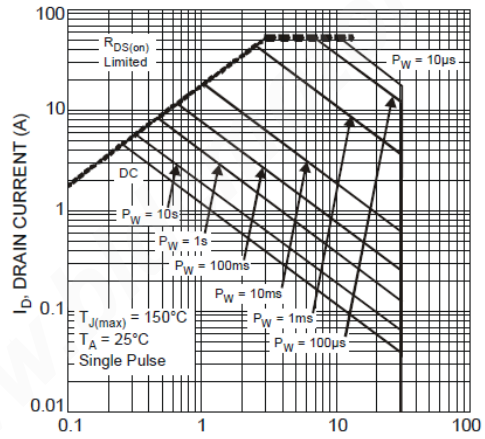
V_{DS},DRAIN-SOURCCE VOLTAGE

Figure10. Typical Junction Capacitance



Qg, TOTAL GATE CHARGE

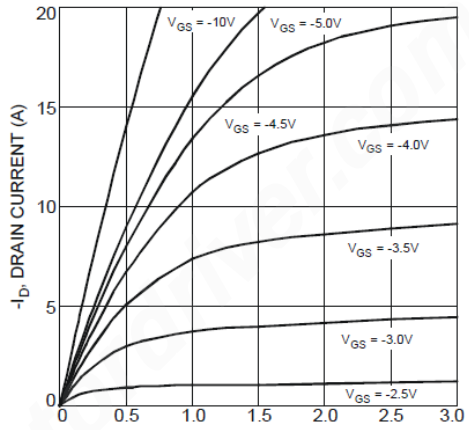
Figure11. Gate Charge



VDS,DRAIN-SOURCE VOLTAGE

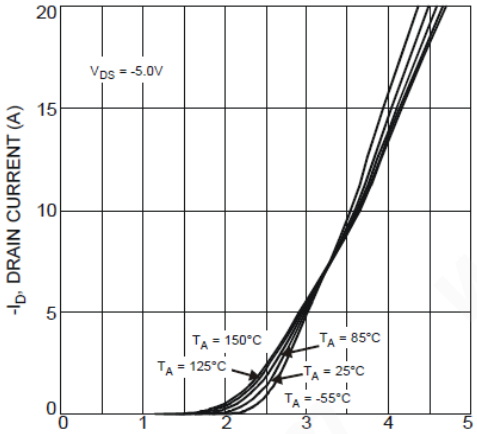
Figure12. SOA, Safe Operation Area

Typical Characteristics(T_J=25° C Noted) P-Channel



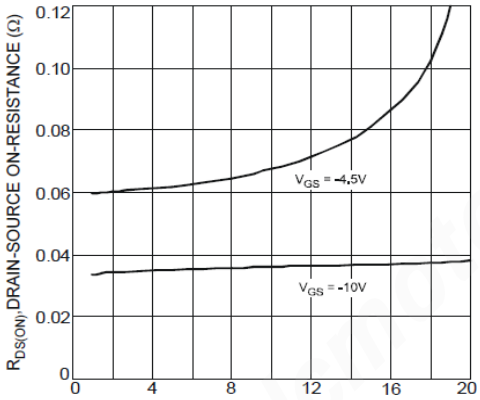
-V_{DS},DRAIN-SOURCE VOLTAGE

Figure13.Typical Output Characteristics



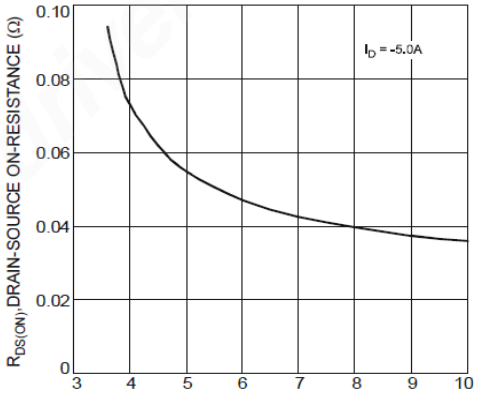
-V_{GS},GATE-SOURCE VOLTAGE

Figure14.Typical Transfer Characteristics



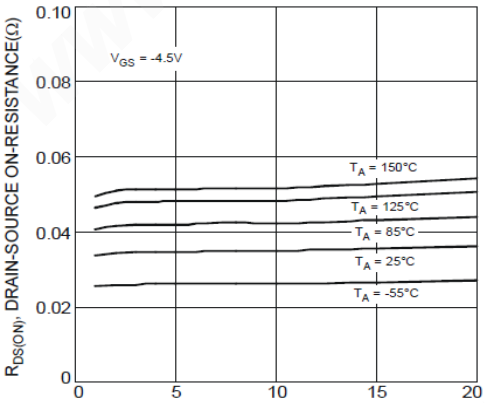
-I_D, DRAIN SOURCE CURRENT

Figure15. Typical On-Resistance vs. Drain Current and Gate Voltage



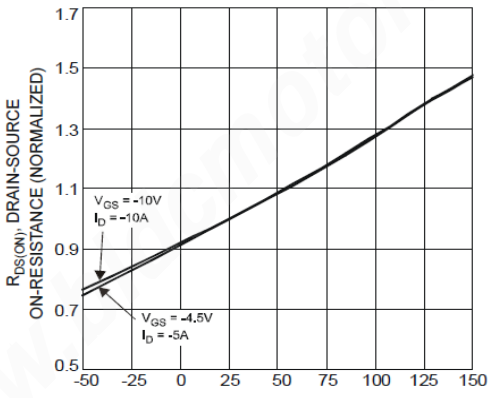
-V_{GS},GATE-SOURCE VOLTAGE

Figure16. Typical On-Resistance vs. Drain Current and Gate Voltage



-I_D, DRAIN SOURCE CURRENT

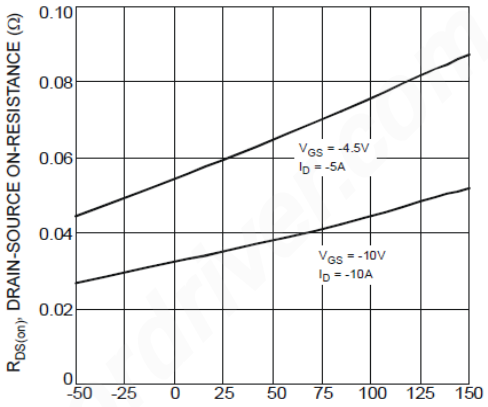
Figure17. Typical On-Resistance vs. Drain Current and Temperature



TJ, JUNCTION TEMPERATURE

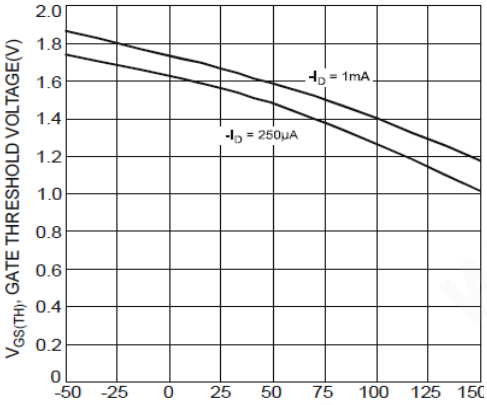
Figure18.On-Resistance Variation with Temperature

Typical Characteristics(T_J=25° C Noted) P-Channel



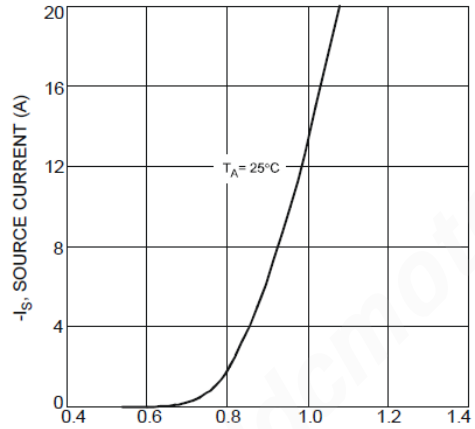
-V_{DS},DRAIN-SOURCE VOLTAGE

Figure19. On-Resistance Variation with Temperature



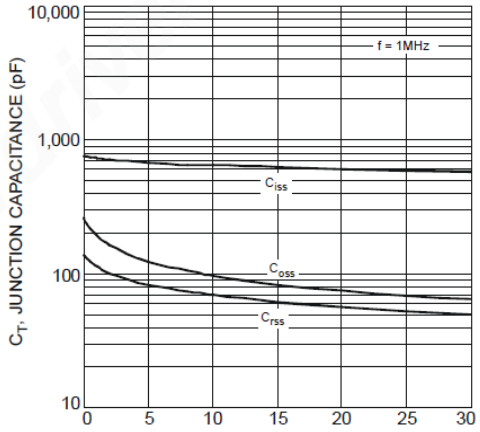
T_J,JUNCTION TEMPERATURE

Figure20. Gate Threshold vs. Ambient Temperature



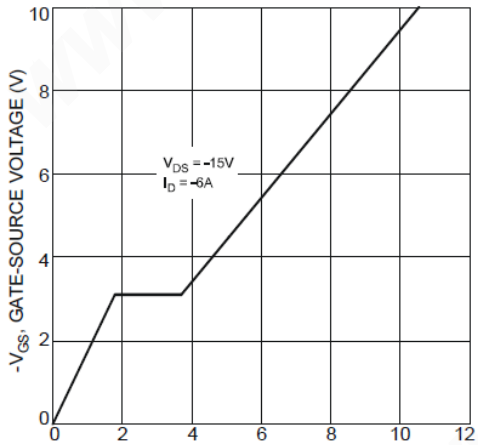
-V_{SD}, SOURCE-DRAIN VOLTAGE

Figure21.Diode Forward Voltage vs.Current



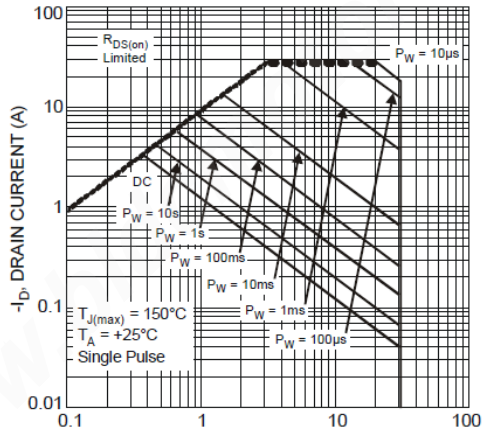
-V_{DS},DRAIN-SOURCCE VOLTAGE

Figure22. Typical Junction Capacitance



Qg, TOTAL GATE CHARGE

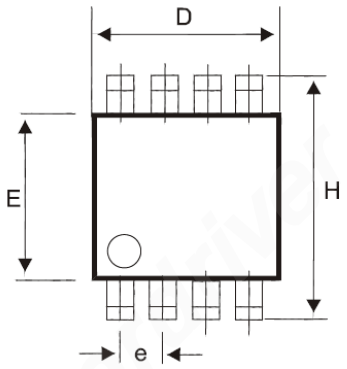
Figure23. Gate Charge

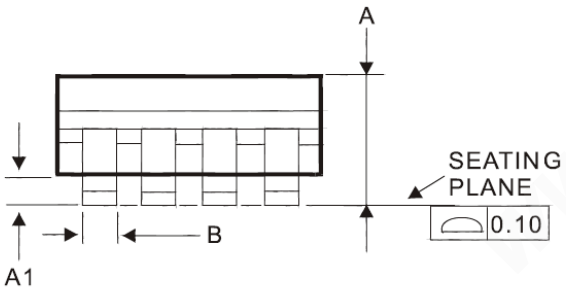


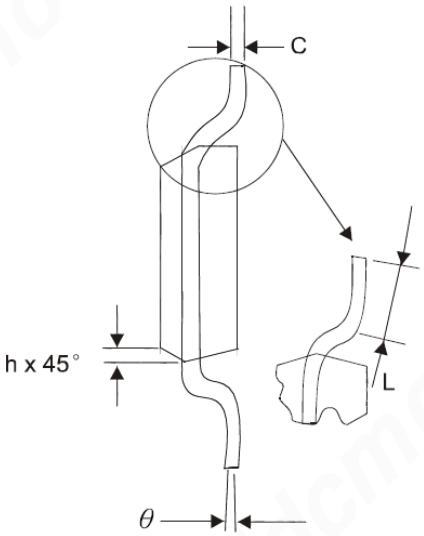
-VDS,DRAIN-SOURCE VOLTAGE

Figure24. SOA, Safe Operation Area

SOP-8 Package Outline







DIM	MILLIMETERS	
	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.18	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.25
θ	0°	7°