



Description

The IRF7389PBF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



SOP-8

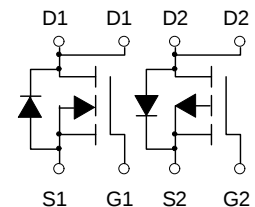
General Features

$V_{DS} = 60V$ $I_D = 7A$

$R_{DS(ON)} < 30m\Omega$ @ $V_{GS}=10V$

$V_{DS} = -60V$ $I_D = -8A$

$R_{DS(ON)} < 29 m\Omega$ @ $V_{GS}=-10V$



N-Channel and P-Channel

Application

Wireless charging

Boost driver

Brushless motor

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
IRF7389PBF	SOP-8	HXY MOSFET	3000

Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	60	-60	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_{D@T_A=25^\circ C}$	Continuous Drain Current, V_{GS} @ 10V ¹	7.0	-8.0	A
$I_{D@T_A=70^\circ C}$	Continuous Drain Current, V_{GS} @ 10V ¹	4.5	-4.8	A
IDM	Pulsed Drain Current ²	18	-30	A
$P_{D@T_A=25^\circ C}$	Total Power Dissipation ⁴	3.5	4	W
TSTG	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	96	41.7	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	36	30	$^\circ C/W$



N-Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =60V, V _{GS} = 0V,	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.6	2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =10V, I _D =4A	-	25	30	mΩ
		V _{GS} =4.5V, I _D =2A	-	34	45	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1.0MHz	-	1349	-	pF
C _{oss}	Output Capacitance		-	84	-	pF
C _{rss}	Reverse Transfer Capacitance		-	59	-	pF
Q _g	Total Gate Charge	V _{DS} =48V, I _D =4A, V _{GS} =4.5V	-	12.6	-	nC
Q _{gs}	Gate-Source Charge		-	3.2	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	6.3	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =30V, I _D =4A, R _G =3.3Ω, V _{GS} =10V	-	7	-	ns
t _r	Turn-on Rise Time		-	14.1	-	ns
t _{d(off)}	Turn-off Delay Time		-	24.3	-	ns
t _f	Turn-off Fall Time		-	4.5	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	7	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	18	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =1A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =5A, dI/dt=100A/μs	-	33	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	53	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega, I_{AS}=8.7A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$



P-Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =-250uA	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Curren	V _{DS} =± 48V , V _{GS} =0V	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{GS} =±20V , V _{DS} =0V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	1.0	1.6	2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =-10V , I _D =-5A	-	24	29	mΩ
		V _{GS} =-4.5V , I _D =-4A	-	30	39	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-25V , V _{GS} =0V , f=1MHz	-	4024	-	pF
C _{oss}	Output Capacitance		-	132	-	pF
C _{rss}	Reverse Transfer Capacitance		-	96	-	pF
Q _g	Total Gate Charge	V _{DS} =-30V , V _{GS} =-10V, I _D =-5A	-	52	-	nC
Q _{gs}	Gate-Source Charge		-	9	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	11	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =-30V , V _{GS} =-10V , R _G =3Ω ,I _D =-1A	-	11	-	ns
t _r	Turn-on Rise Time		-	8	-	ns
t _{d(off)}	Turn-off Delay Time		-	62	-	ns
t _f	Turn-off Fall Time		-	12	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _s	Maximum Continuous Drain to Source Diode Forward Current		-	-	-8	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-30	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =-1A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =5A, dI/dt=100A/μs	-	70	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	60	-	nC

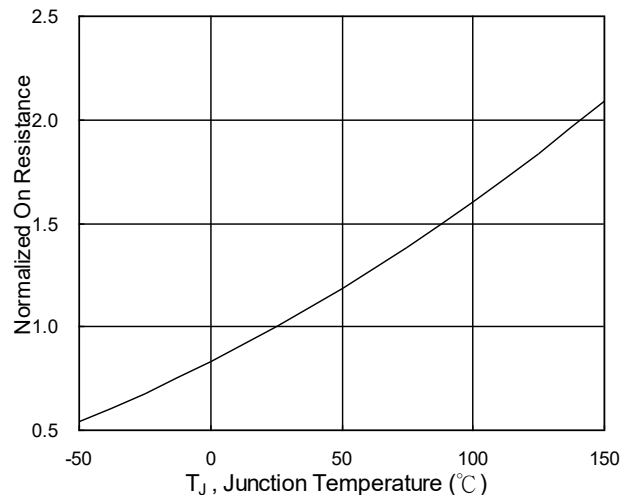
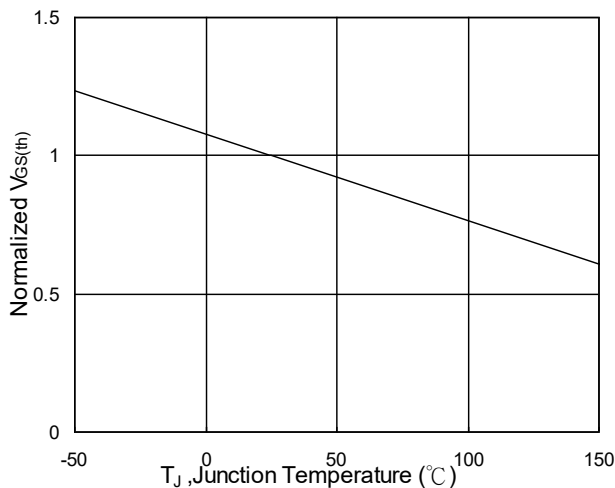
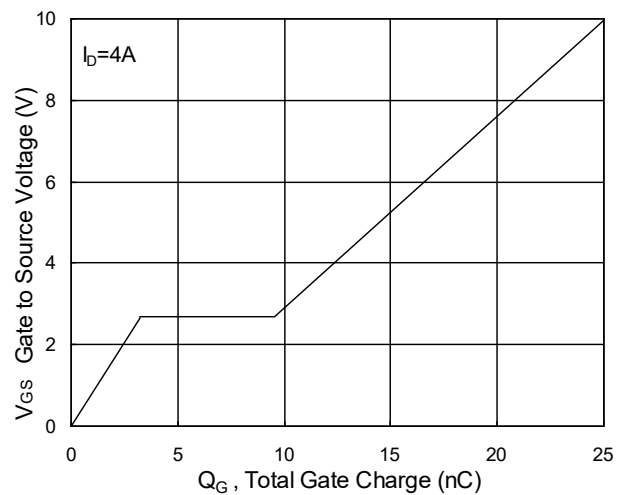
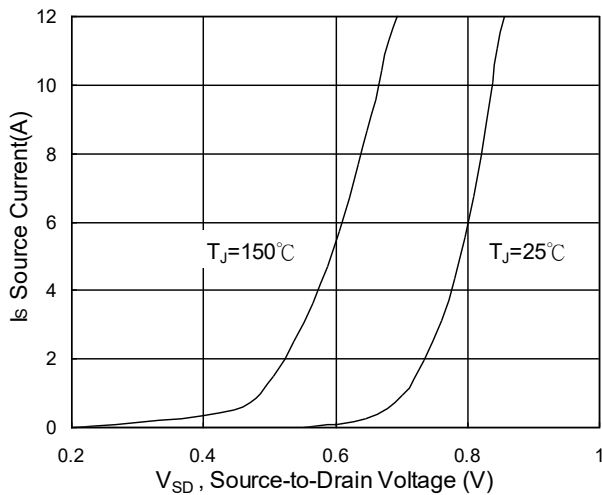
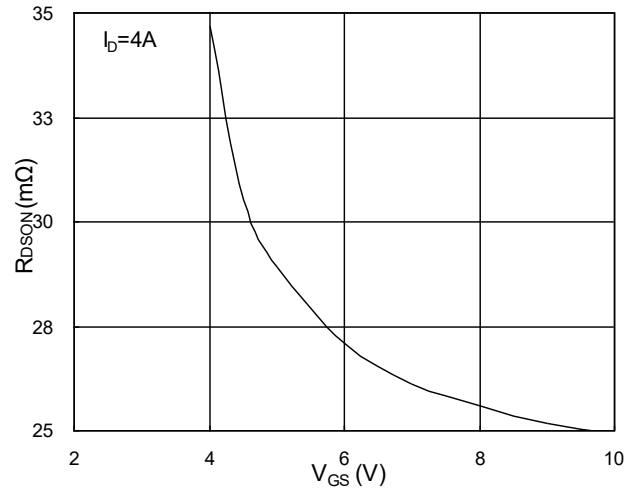
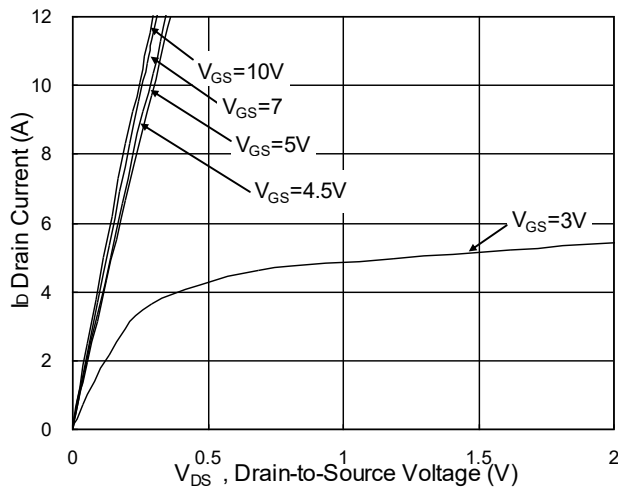
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition : $T_J=25^{\circ}\text{C}$, $V_{DD}=30V$, $V_G=10V$, $L=0.5mH$, $R_G=25\Omega$, $I_{AS}=8.7A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$



N-Channel Typical Characteristics



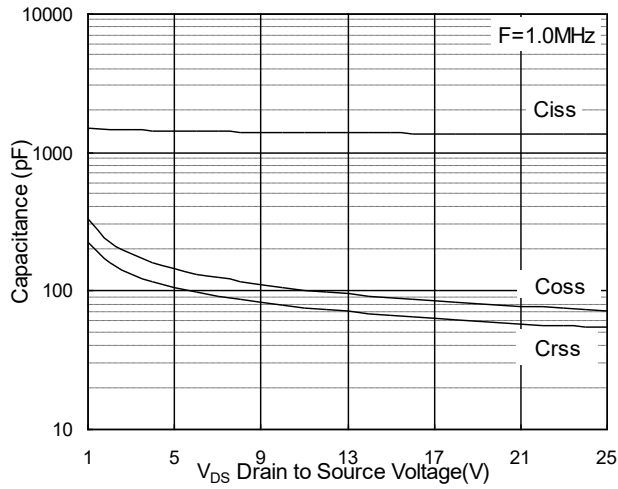


Fig.7 Capacitance

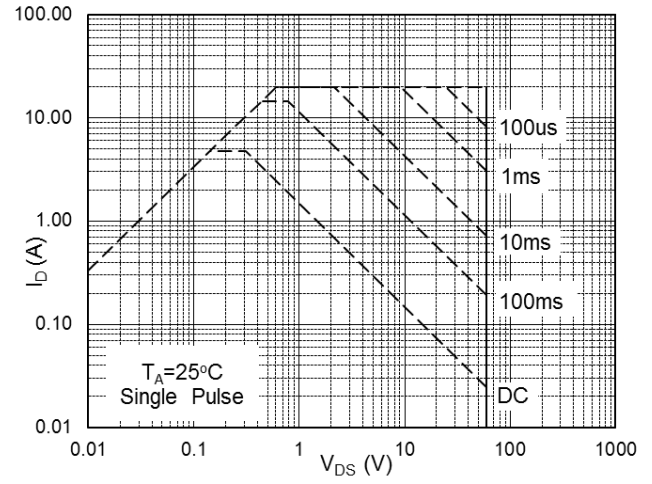


Fig.8 Safe Operating Area

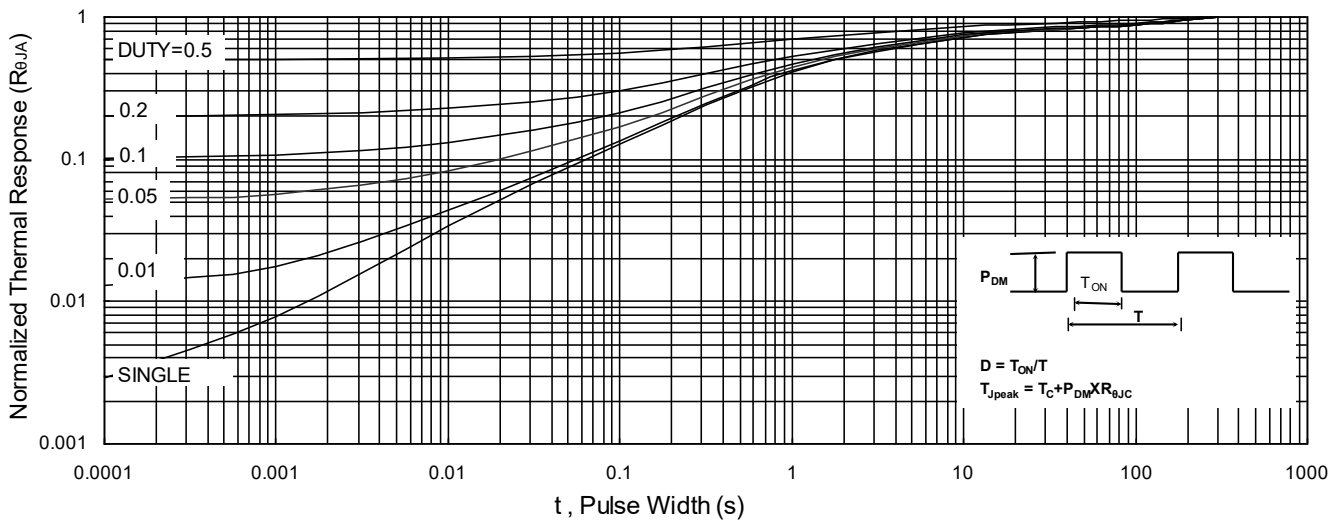


Fig.9 Normalized Maximum Transient Thermal Impedance



P-Channel Typical Characteristics

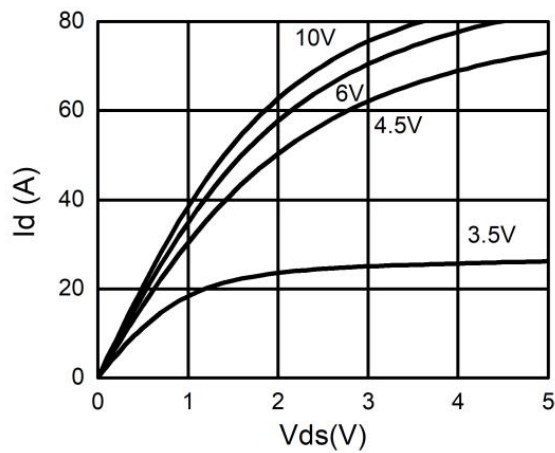


Figure 1. Output Characteristics

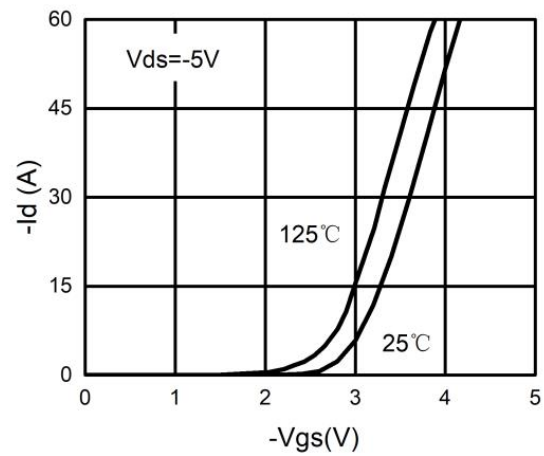


Figure 2. Transfer Characteristics

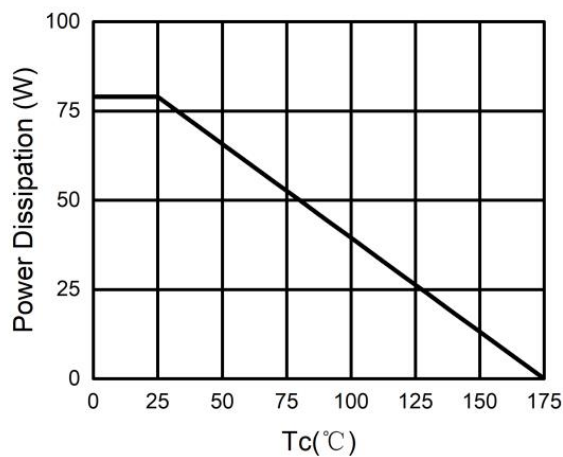


Figure 3. Power Dissipation

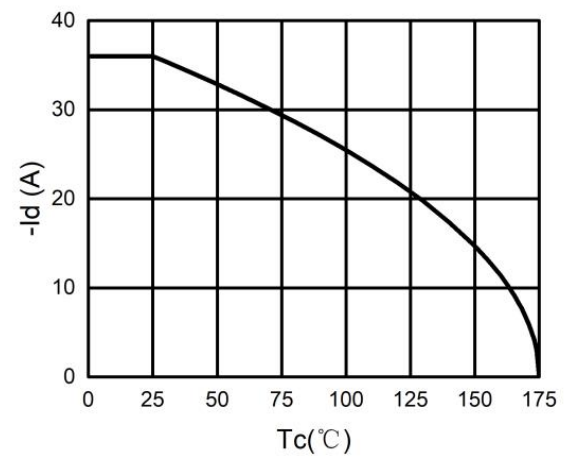


Figure 4. Drain Current

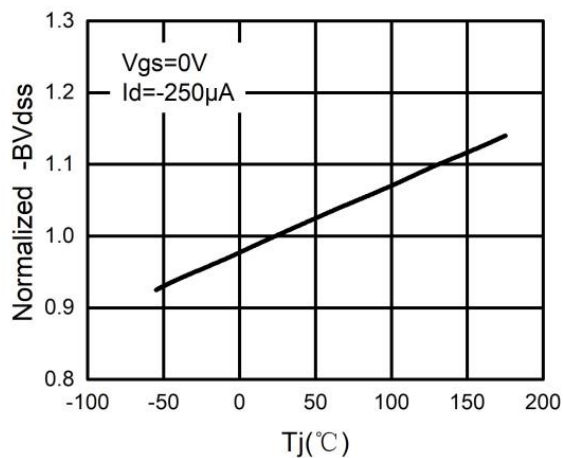


Figure 5. BV_{DSS} vs Junction Temperature

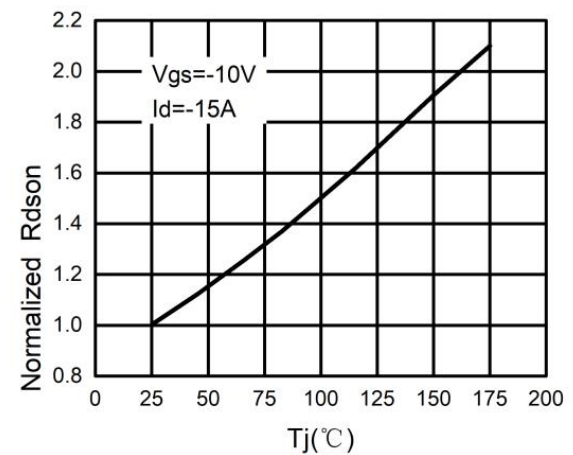


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

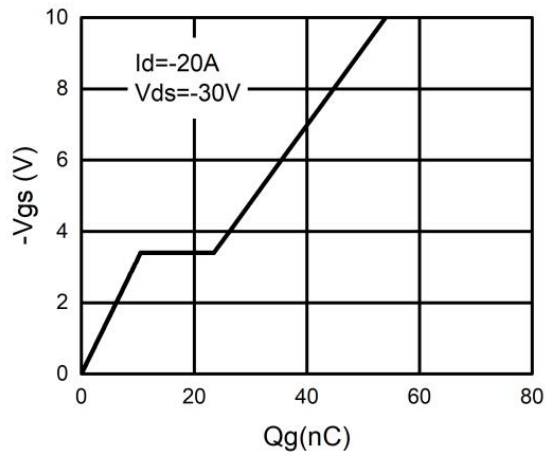


Figure 7. Gate Charge Waveforms

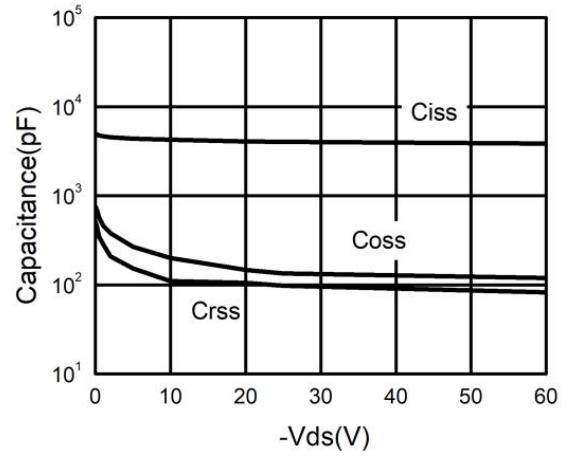


Figure 8. Capacitance

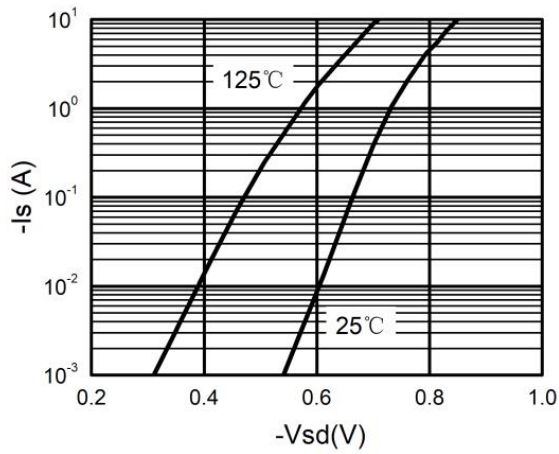


Figure 9. Body-Diode Characteristics

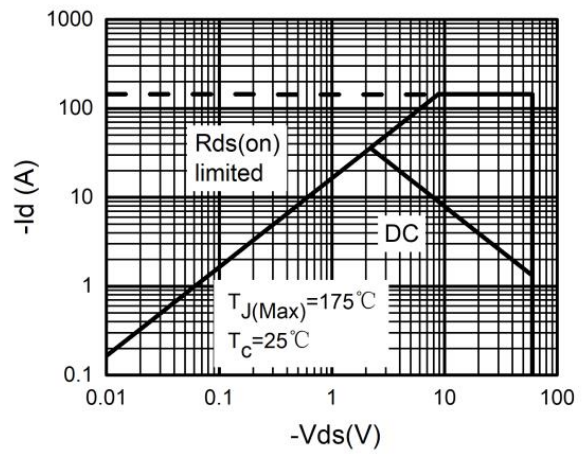
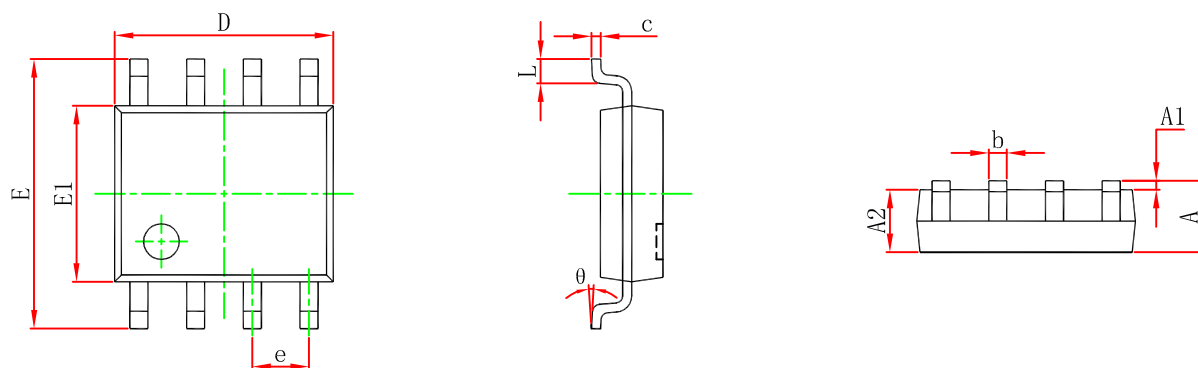


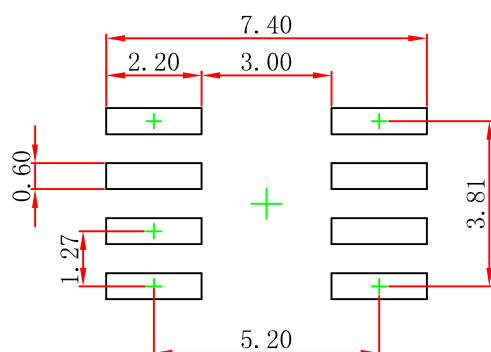
Figure 10. Maximum Safe Operating Area



SOP-8 Package Outline Dimensions



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	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:

1. Controlling dimension; in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.



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