N-Channel and P-Channel 40V(D-S) MOSFET

Product summary			
V_{DS}	40	-40	V
$R_{DS(ON)}$(at V_{GS}=10V) Typ.	28	67	mΩ
$R_{DS(ON)}$(at V_{GS}=4.5V) Typ.	38	90	mΩ
I_D(T_A=25℃)	5	-5.3	A

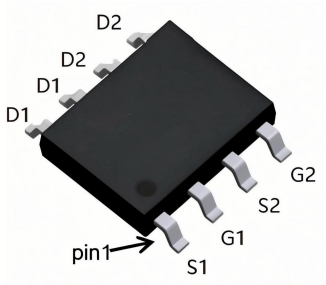
Features

- Super Low Gate Charge
- Advanced high cell density Trench technology

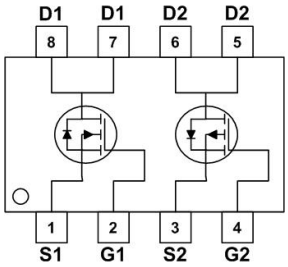
Applications

- Power management functions
- Load switch

Pin Configuration



SOP8



Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECHA05C04C	SOP8	13″	3000pcs

Absolute Maximum Ratings (at T_A=25℃ Unless Otherwise Noted)

Symbol	Parameter		N-Rating	P-Rating	Units
V_{DS}	Drain-Source Voltage		40	-40	V
V_{GS}	Gate-Source Voltage		±20	±20	V
I_D	Continuous Drain Current at V_{GS}=10V [A]	T_A=25℃	5	-5.3	A
		T_A=70℃	4	-4.2	A
I_{DM}	Pulse Drain Current Tested [B]		20	-20	A
P_D	Power Dissipation [A]		2.5	1.5	W
T_J,T_{STG}	Junciton and Storage Temperature Range		-55 to +150	-55 to +150	℃

Thermal Characteristics

Symbol	Parameter	Typical	Units
$R_{\theta JA}$	Thermal Resistance-Junction to ambient [A]	83	℃/W

N-Channel Electrical Characteristics (at T_J =25℃ Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=250uA	40	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V,V_{GS}=0V	--	--	1	uA
I_{GSS}	Gate-Body Leakage Current	V_{DS}=0V,V_{GS}=±20V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	1.0	1.5	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance [B]	V_{GS}=10V,I_D=5A	--	28	43	mΩ
		V_{GS}=4.5V,I_D=3A	--	38	58	mΩ
V_{SD}	Diode Forward Voltage	I_S=5A,V_{GS}=0V	--	--	1.2	V
I_S	Maximum Body-Diode Continuous Current		--	--	5	A
Dynamic Parameters [C]						
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=20V f=1MHZ	--	490	--	pF
C_{oss}	Output Capacitance		--	92	--	pF
C_{rss}	Reverse Transfer Capacitance		--	68	--	pF
Q_g	Total Gate Charge	V_{DS}=20V,I_D=3.5A V_{GS}=10V	--	5.2	--	nC
Q_{gs}	Gate-Source Charge		--	0.9	--	nC
Q_{gd}	Gate-Drain Charge		--	1.3	--	nC
$t_{D(on)}$	Turn-on Delay Time	V_{DD}=20V R_L=2Ω,R_G=3Ω, V_{GS}=10V	--	13	--	nS
t_r	Turn-on Rise Time		--	52	--	nS
$t_{D(off)}$	Turn-off Delay Time		--	17	--	nS
t_f	Turn-off Fall Time		--	10	--	nS

A. The data tested by surface mounted on a 1 inch x 1 inch FR-4 board with 2OZ copper.

B. Pulse Test: Pulse Width≤300us,Duty cycle ≤2%.

C. Guaranteed by design, not subject to production testing.

P-Channel Electrical Characteristics (at T_J =25℃ Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=-250uA	-40	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-40V,V_{GS}=0V	--	--	-1	uA
I_{GSS}	Gate-Body Leakage Current	V_{DS}=0V,V_{GS}=±20V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=-250uA	-1.0	--	-3.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance [B]	V_{GS}=-10V,I_D=-5A	--	67	80	mΩ
		V_{GS}=-4.5V,I_D=-4A	--	90	118	mΩ
V_{SD}	Diode Forward Voltage	I_S=-5A,V_{GS}=0V	--	--	-1.2	V
I_{SM}	Maximum Body-Diode Continuous Current		--	--	-5.3	A
Dynamic Parameters [C]						
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=-20V f=1MHZ	--	600	--	pF
C_{oss}	Output Capacitance		--	90	--	pF
C_{rss}	Reverse Transfer Capacitance		--	70	--	pF
Q_g	Total Gate Charge	V_{DS}=-20V,I_D=-5A V_{GS}=-10V	--	14	--	nC
Q_{gs}	Gate-Source Charge		--	2.9	--	nC
Q_{gd}	Gate-Drain Charge		--	3.8	--	nC
$t_{D(on)}$	Turn-on Delay Time	V_{DD}=-20V R_L=2Ω,R_G=3Ω, V_{GS}=-10V	--	9	--	nS
t_r	Turn-on Rise Time		--	8	--	nS
$t_{D(off)}$	Turn-off Delay Time		--	28	--	nS
t_f	Turn-off Fall Time		--	10	--	nS

B.Pulse Test: Pulse Width≤300us,Duty cycle ≤2%.

C. Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

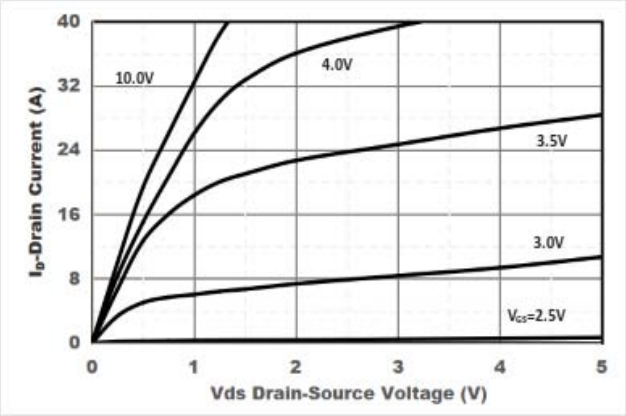


Figure1. Output Characteristics

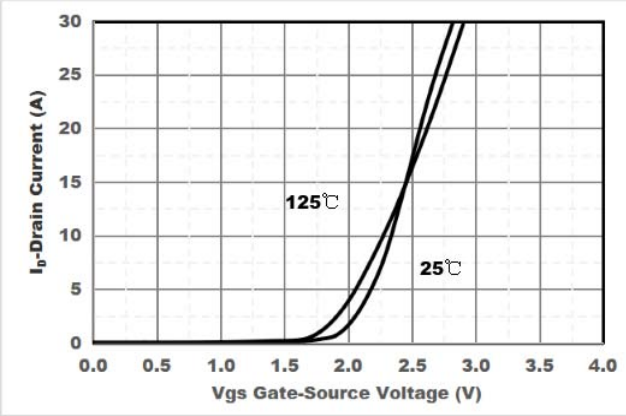


Figure2. Transfer Characteristics

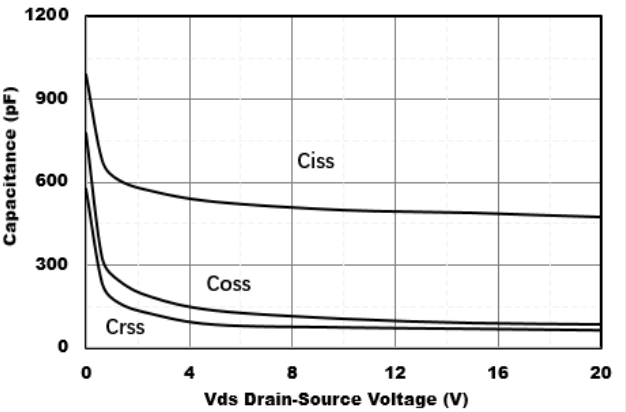


Figure3. Capacitance Characteristics

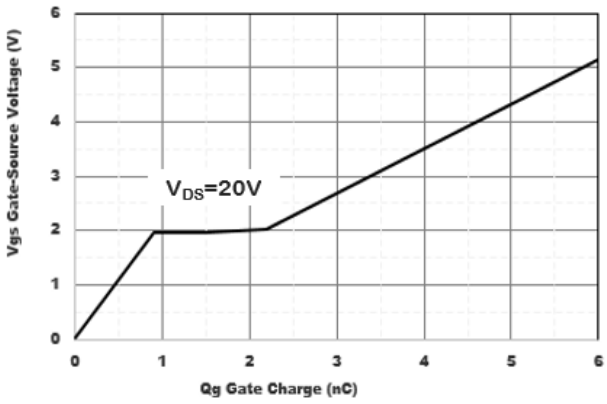


Figure4. Gate Charge

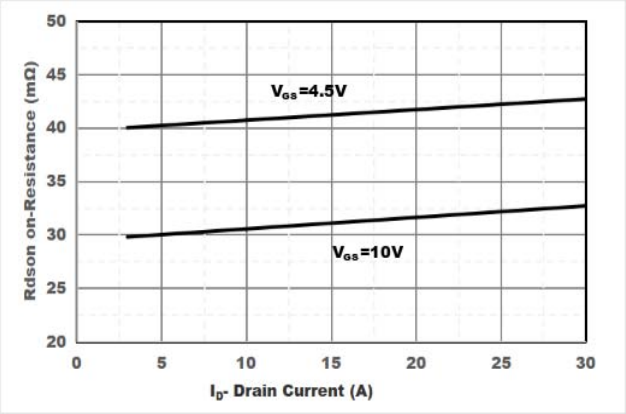


Figure5. Drain-Source on Resistance

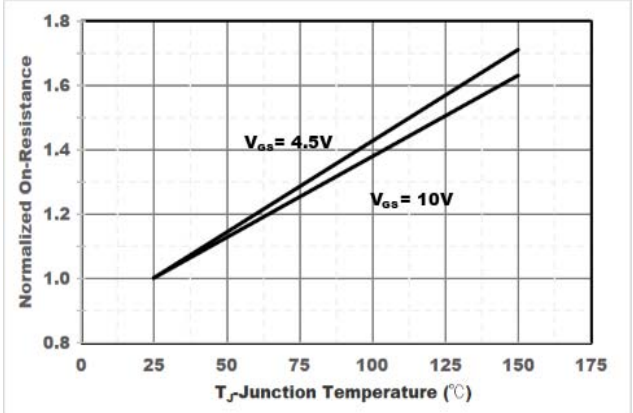


Figure6. Drain-Source on Resistance

N-Channel Typical Characteristics

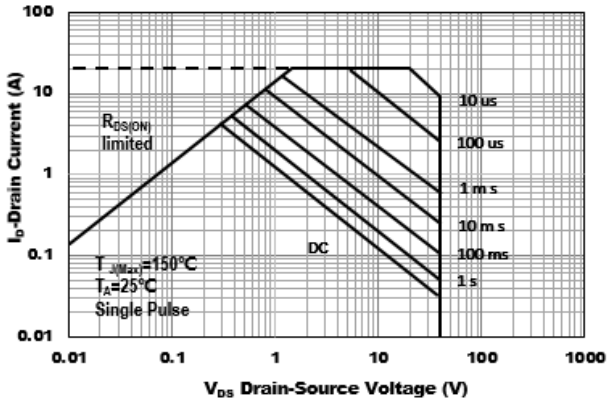


Figure7. Safe Operation Area

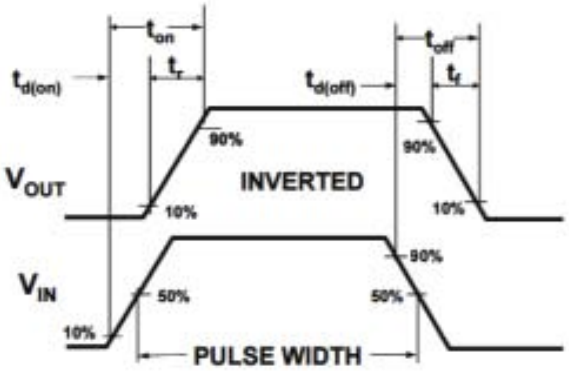


Figure8. Switching wave

P-Channel Typical Characteristics

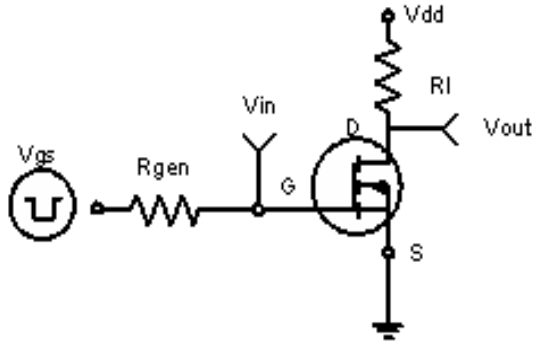


Figure 1:Switching Test Circuit

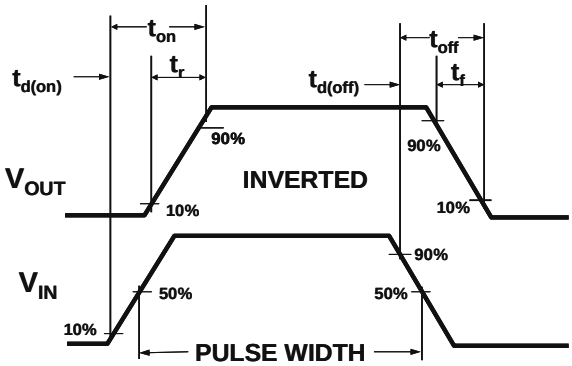


Figure 2:Switching Waveforms

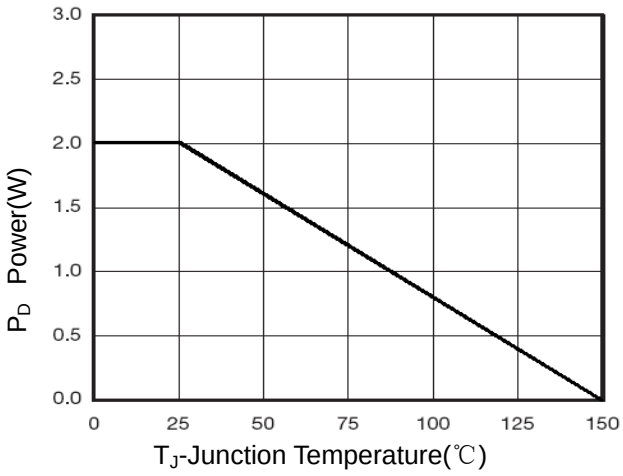


Figure 3 Power Dissipation

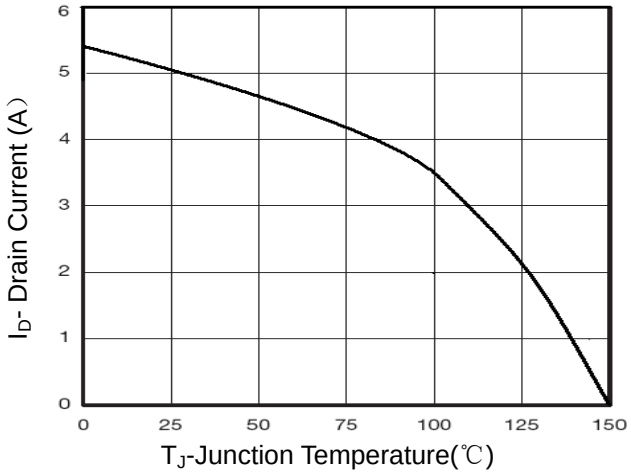


Figure 4 Drain Current

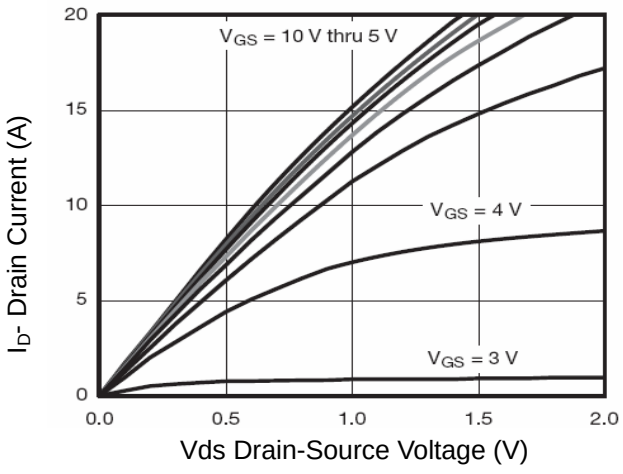


Figure 5 Output Characteristics

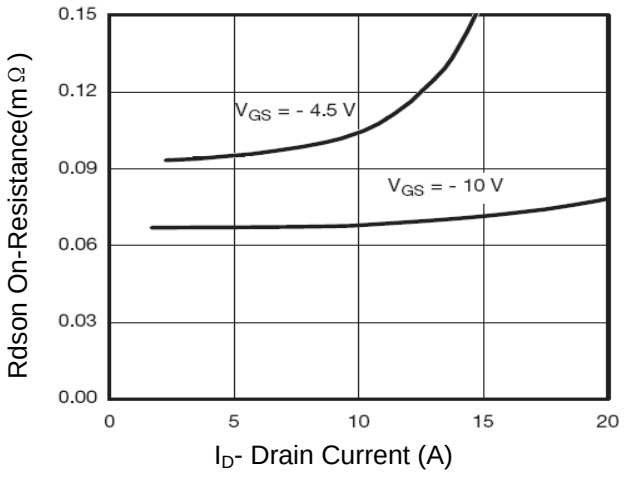


Figure 6 Drain-Source On-Resistance

P-Channel Typical Characteristics

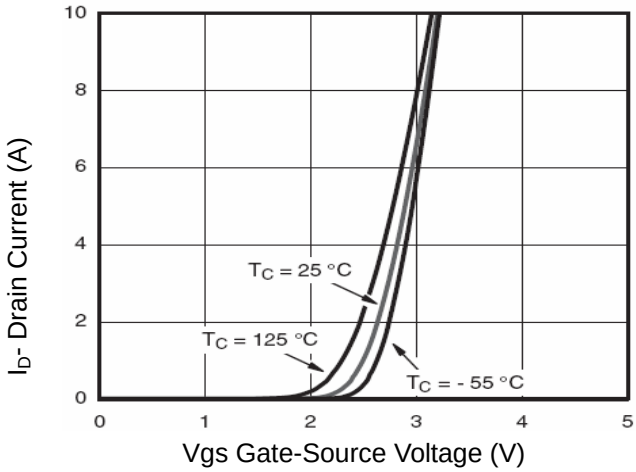


Figure 7 Transfer Characteristics

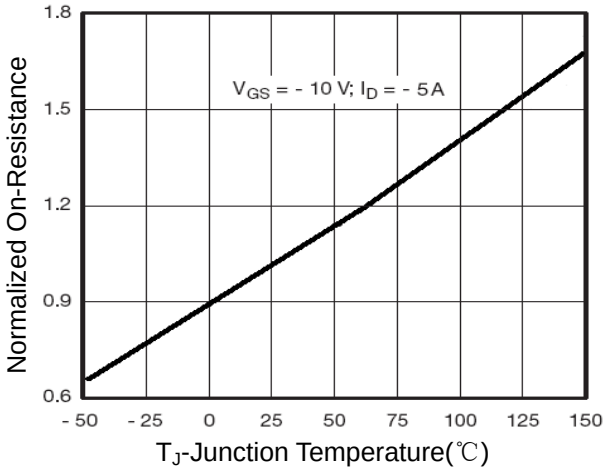


Figure 8 Drain-Source On-Resistance

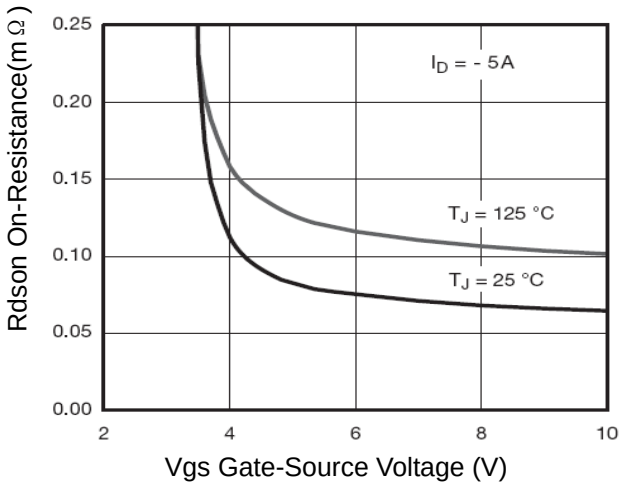


Figure 9 Rdson vs Vgs

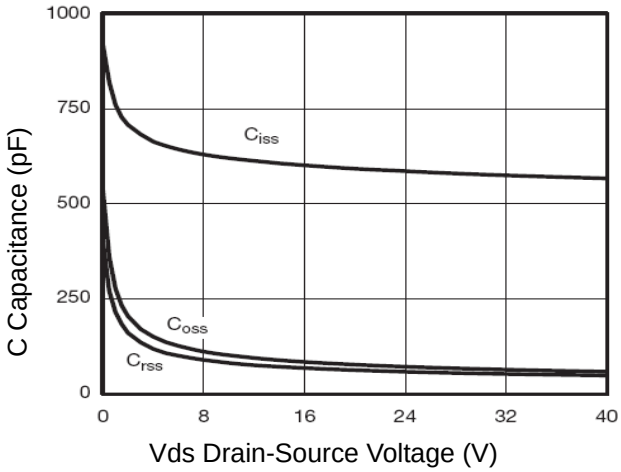


Figure 10 Capacitance vs Vds

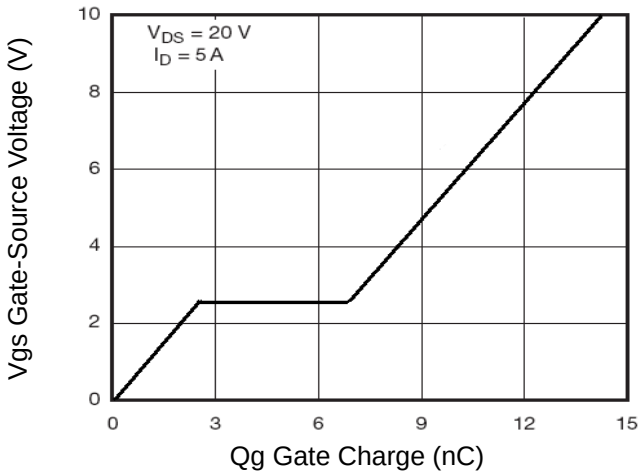


Figure 11 Gate Charge

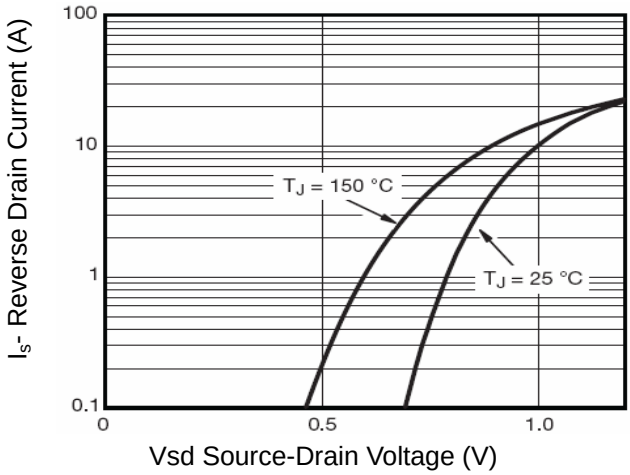


Figure 12 Source- Drain Diode Forward

P-Channel Typical Characteristics

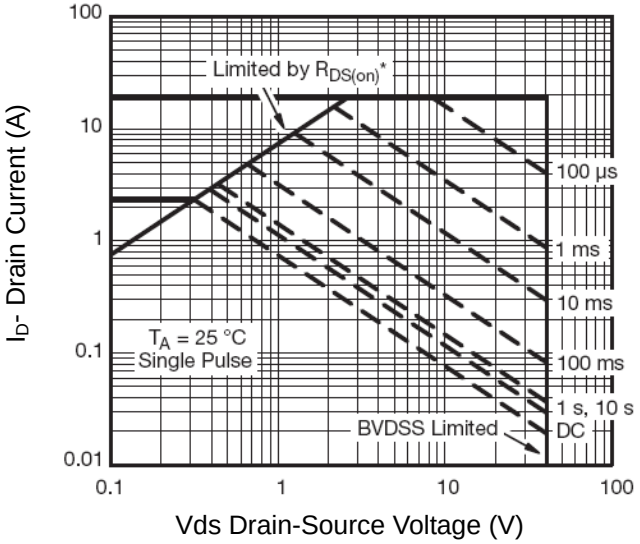


Figure 13 Safe Operation Area

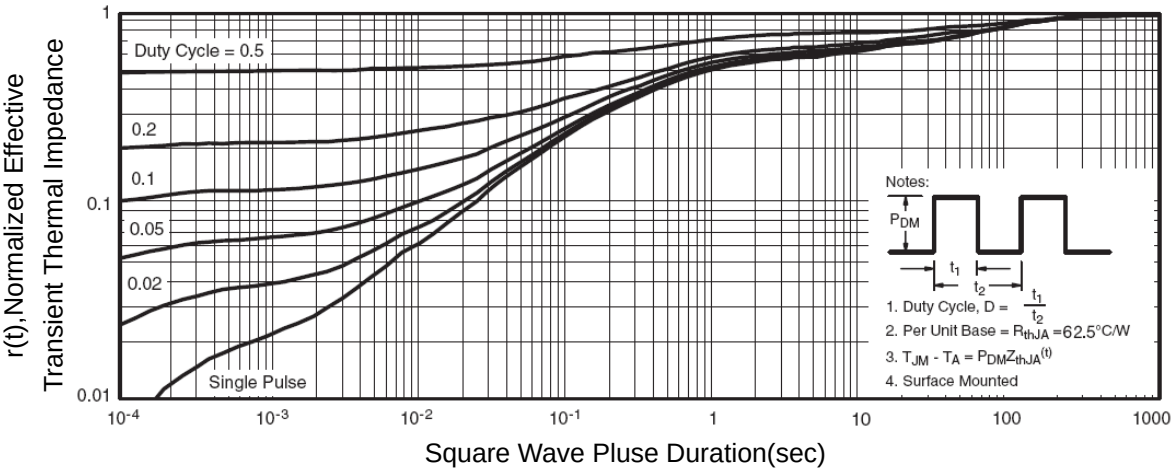
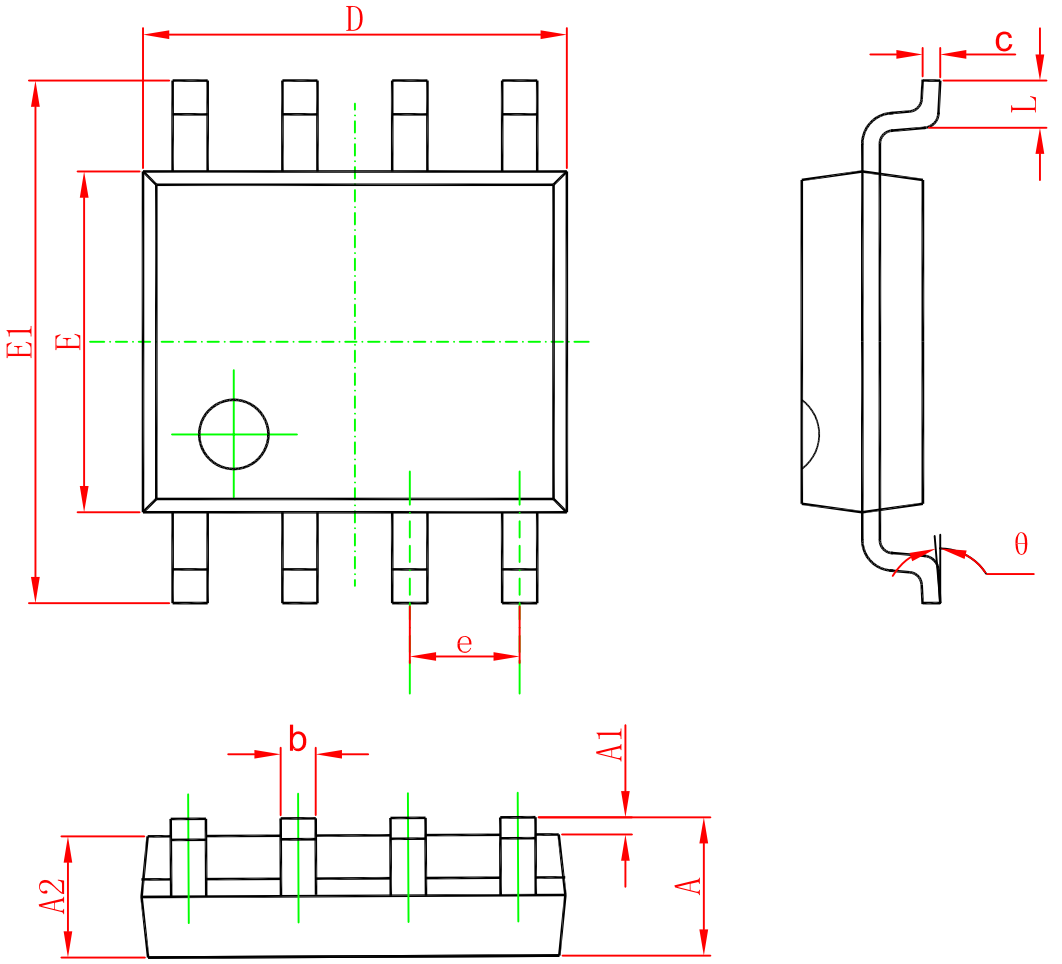


Figure 14 Normalized Maximum Transient Thermal Impedance

SOP8 Package Information



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	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°