N and P-Channel Enhancement Mode Power MOSFET

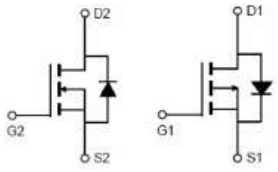
Description

The MJ30NP07S uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge.
The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

General Features

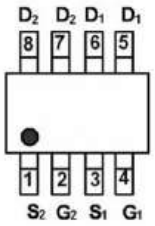
N-Channel	P-Channel
◆ V_{DS}=30V,I_D=6.5A	V_{DS}=-30V,I_D=-7A
$R_{DS(ON)}$<24mΩ @ V_{GS}=10V	$R_{DS(ON)}$<32mΩ @ V_{GS}=-10V
$R_{DS(ON)}$<37mΩ @ V_{GS}=4.5V	$R_{DS(ON)}$<70mΩ @ V_{GS}=-4.5V

◆ High power and current handing capability
◆ Lead free product is acquired
◆ Surface mount package

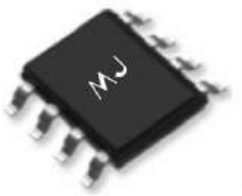


N-channel P-channel

Schematic diagram



Marking and pin assignment



SOP-8 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJ30NP07S	MJ30NP07S	SOP-8	Ø330mm	12mm	4000 units

Absolute Maximum Ratings (T_A =25℃ unless otherwise noted)

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	30	-30	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current	T_A=25°C	I_D	6.5	-7	A
	T_A=70°C	I_D	5.4	-5.8	A
Pulsed Drain Current (Note 1)		I_{DM}	30	-30	A
Maximum Power Dissipation	T_A=25°C	P_D	2.0	2.0	W
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 To 150	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	N-Ch	62.5	℃/W
Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	P-Ch	62.5	℃/W

N-CH Electrical Characteristics (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	30	33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} ,I_D=250μA	1	1.6	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=6A	-	19	24	mΩ
		V_{GS}=4.5V, I_D=6A	-	26	37	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=6A	15	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS}=15V,V_{GS}=0V F=1.0MHz	-	485.8	-	PF
Output Capacitance	C_{oss}		-	65.2	-	PF
Reverse Transfer Capacitance	C_{rss}		-	54	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=15V, R_L=2.5Ω V_{GS}=10V,R_{GEN}=3Ω	-	4.0	-	nS
Turn-on Rise Time	t_r		-	2.0	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	14.0	-	nS
Turn-Off Fall Time	t_f		-	3.0	-	nS
Total Gate Charge	Q_g	V_{DS}=15V,I_D=6A V_{GS}=10V	-	12.6	-	nC
Gate-Source Charge	Q_{gs}		-	1.9	-	nC
Gate-Drain Charge	Q_{gd}		-	2.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=6A	-	0.8	1.2	V

P-CH Electrical Characteristics (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-30	-33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} ,I_D=-250μA	-1.3	-1.65	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-6.5A	-	28	32	mΩ
		V_{GS}=-4.5V, I_D=-6.5A	-	49	70	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-6.5A	10	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS}=-15V,V_{GS}=0V F=1.0MHz	-	691.9	-	PF
Output Capacitance	C_{oss}		-	113.7	-	PF
Reverse Transfer Capacitance	C_{rss}		-	109.4	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V, R_L=2.3Ω V_{GS}=-10V,R_{GEN}=6Ω	-	7.5	-	nS
Turn-on Rise Time	t_r		-	5.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	19	-	nS
Turn-Off Fall Time	t_f		-	7	-	nS
Total Gate Charge	Q_g	V_{DS}=-15V,I_D=-6.5A V_{GS}=-10V	-	16.3	-	nC
Gate-Source Charge	Q_{gs}		-	2.2	-	nC
Gate-Drain Charge	Q_{gd}		-	4.1	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-6.5A	-	-	-1.2	V

Notes:

① Repetitive Rating: Pulse width limited by maximum junction temperature.
② Surface Mounted on FR4 Board, t ≤ 10 sec.
③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
④ Guaranteed by design, not subject to production

N- Channel Typical Electrical and Thermal Characteristics (Curves)

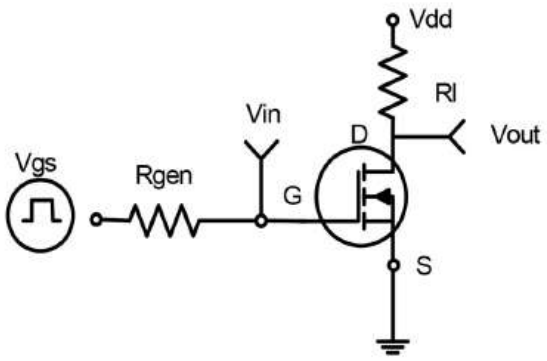


Figure 1 Switching Test Circuit

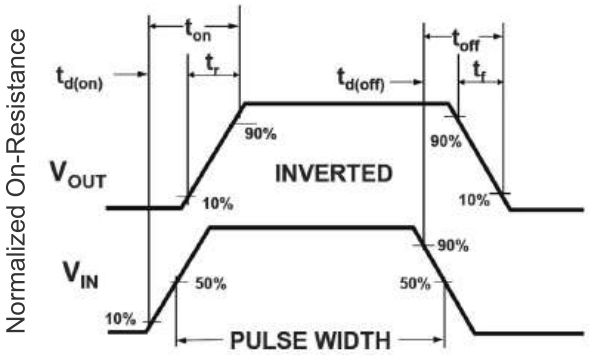
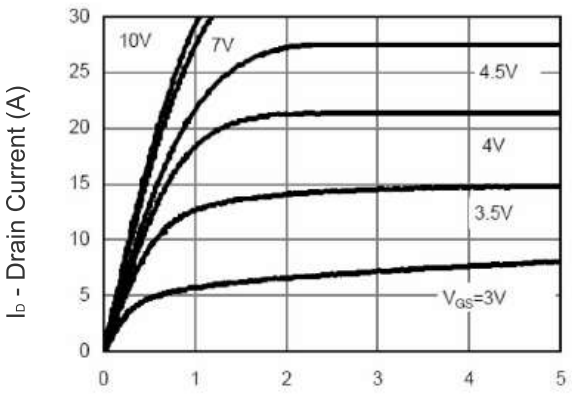
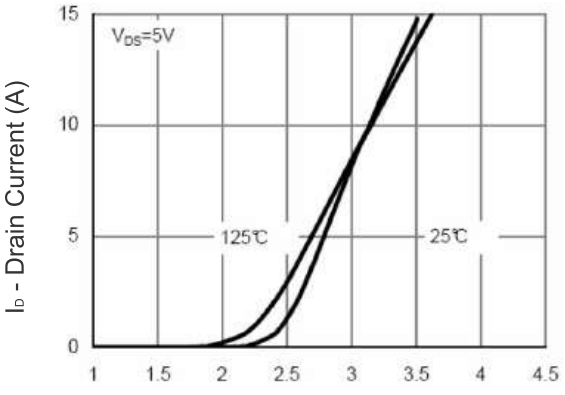


Figure 2 Switching Waveforms



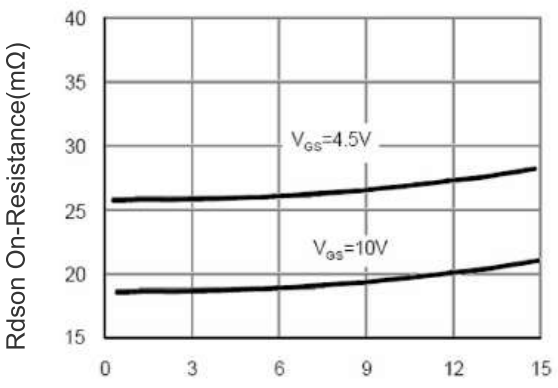
Vds Drain-Source Voltage (V)

Figure 3 Output Characteristics



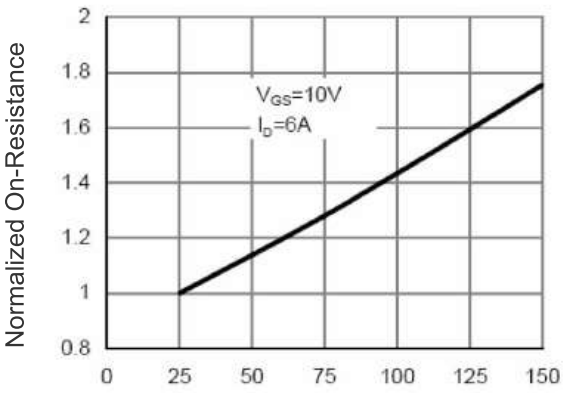
Vgs Gate-Source Voltage (V)

Figure 4 Transfer Characteristics



I_D- Drain Current (A)

Figure 5 Drain-Source On-Resistance



T_J -Junction Temperature(℃)

Figure 6 Drain-Source On-Resistance

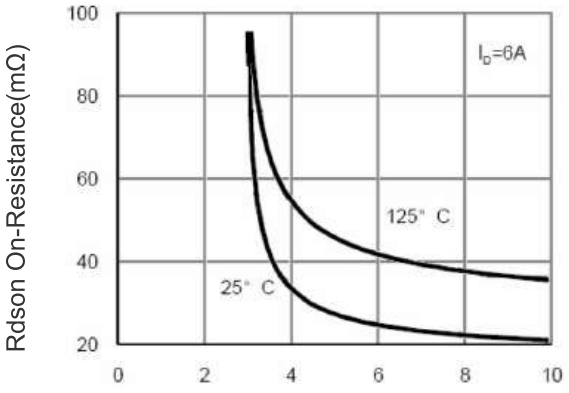


Figure7 Rdson vs Vgs

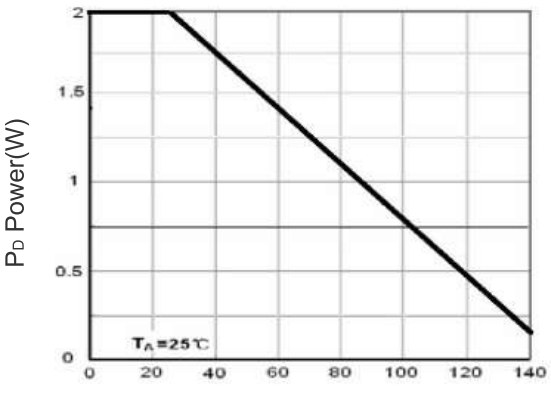


Figure 8 Power Dissipation

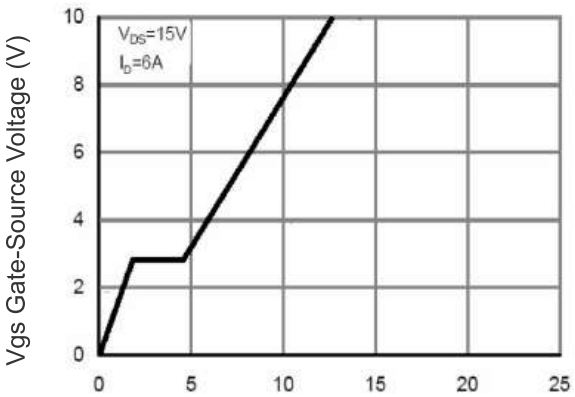


Figure 9 Gate Charge

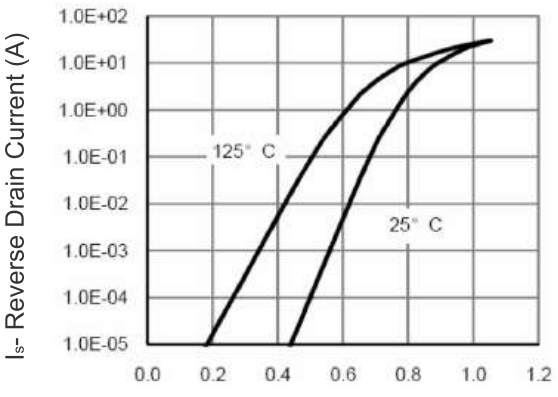


Figure 10 Source- Drain Diode Forward

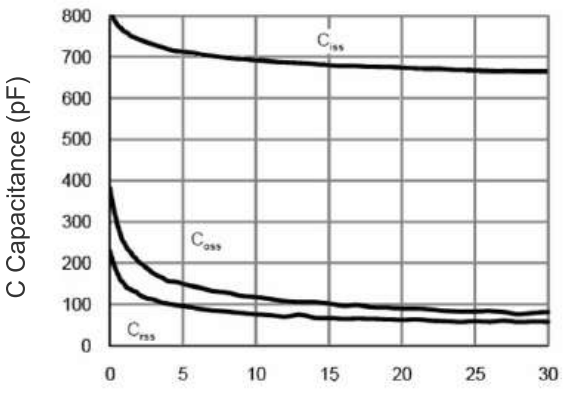


Figure 11 Capacitance vs Vds

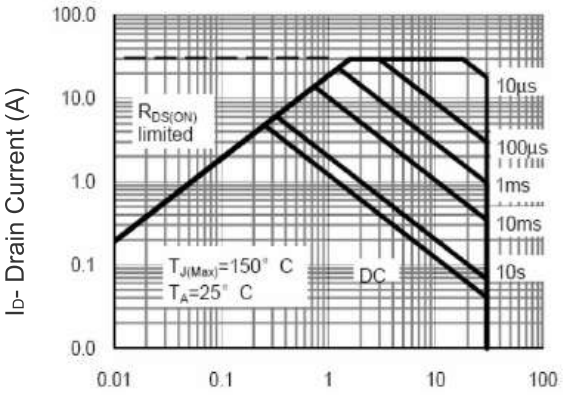


Figure 12 Safe Operation Area

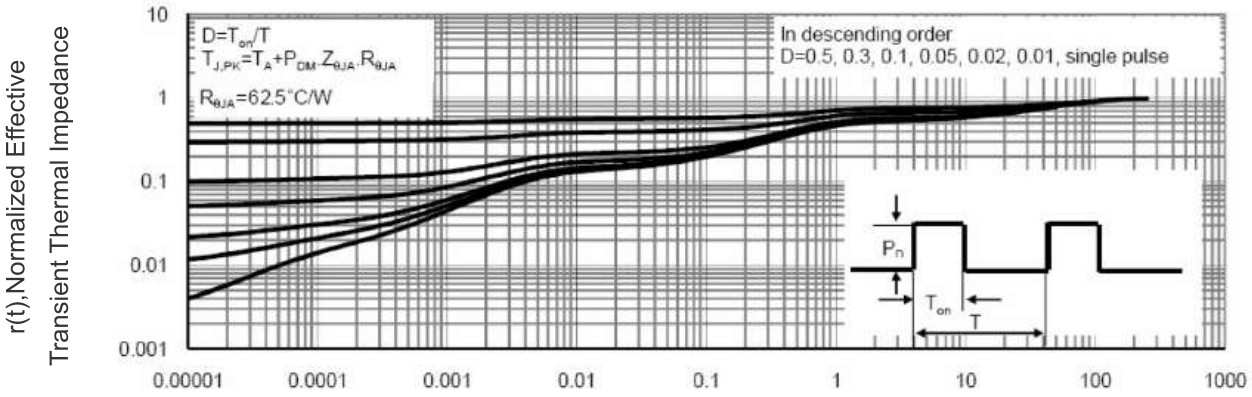


Figure 13 Normalized Maximum Transient Thermal Impedance

P- Channel Typical Electrical and Thermal Characteristics (Curves)

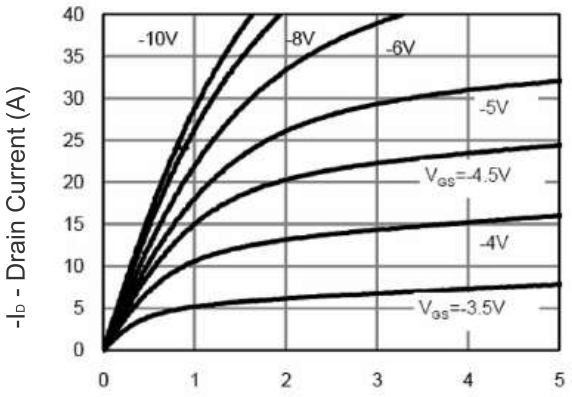


Figure 1 Output Characteristics

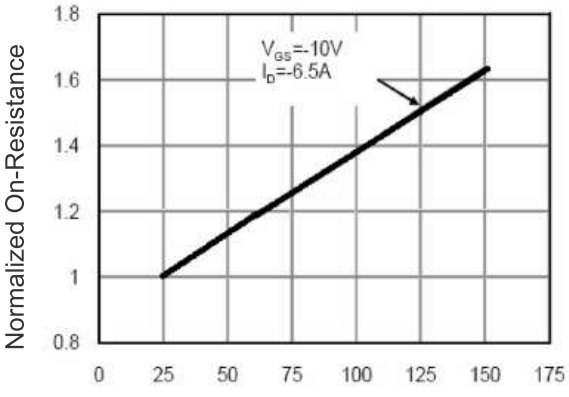


Figure 4 Rdson-Junction Temperature

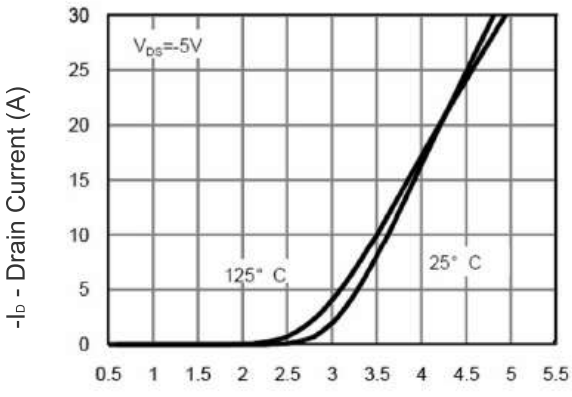


Figure 2 Transfer Characteristics

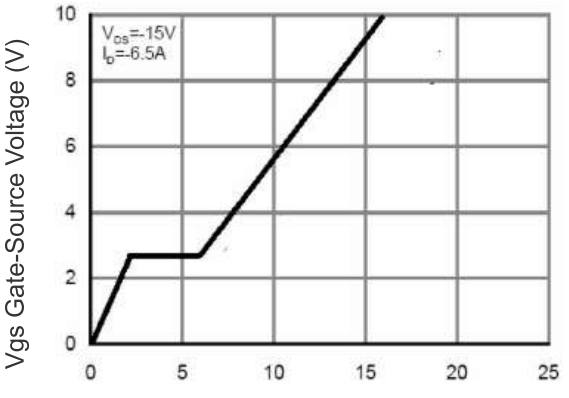


Figure 5 Gate Charge

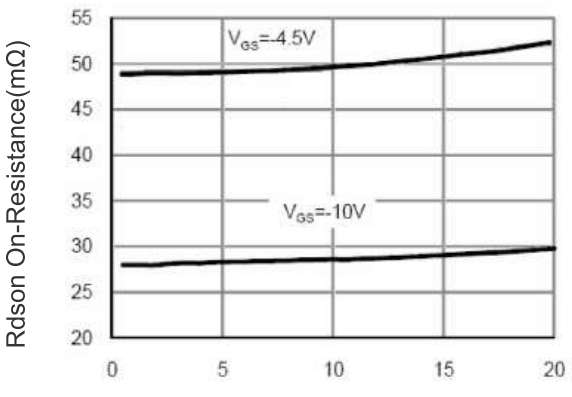


Figure 3 Rdson- Drain Current

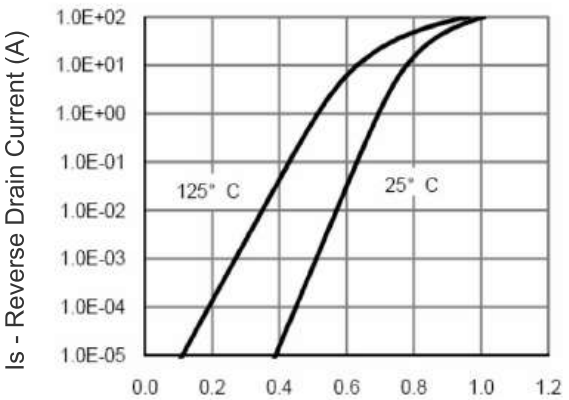


Figure 6 Source- Drain Diode Forward

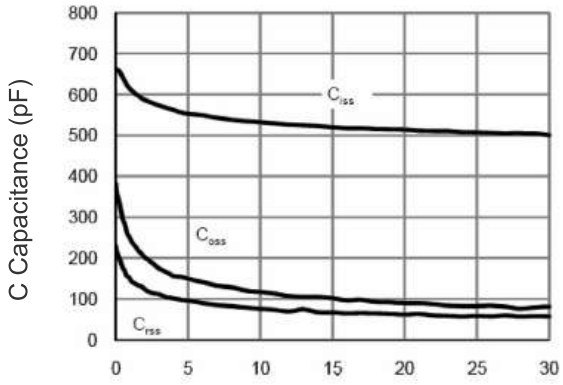


Figure 7 Capacitance vs Vds

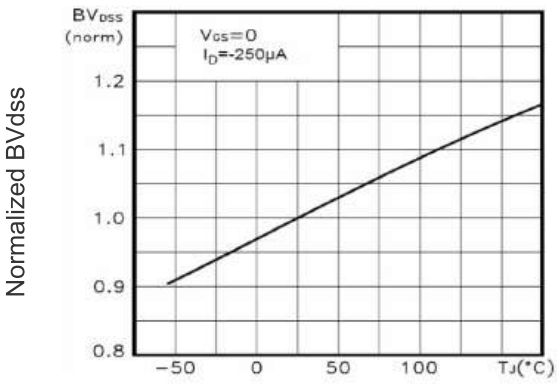


Figure 9 BVDSS vs Junction Temperature

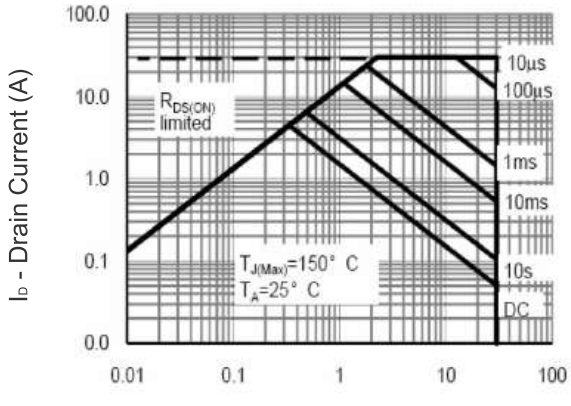


Figure 8 Safe Operation Area

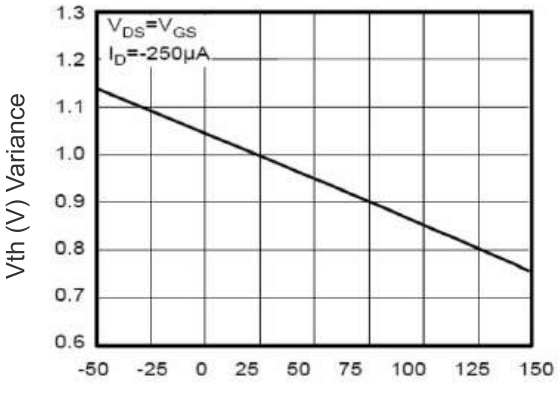


Figure 10 $V_{GS(th)}$ vs Junction Temperature

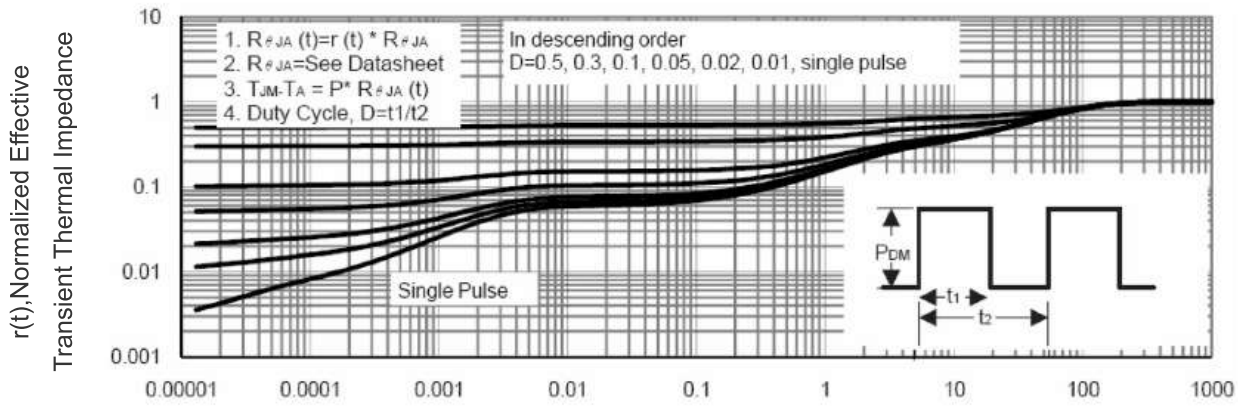
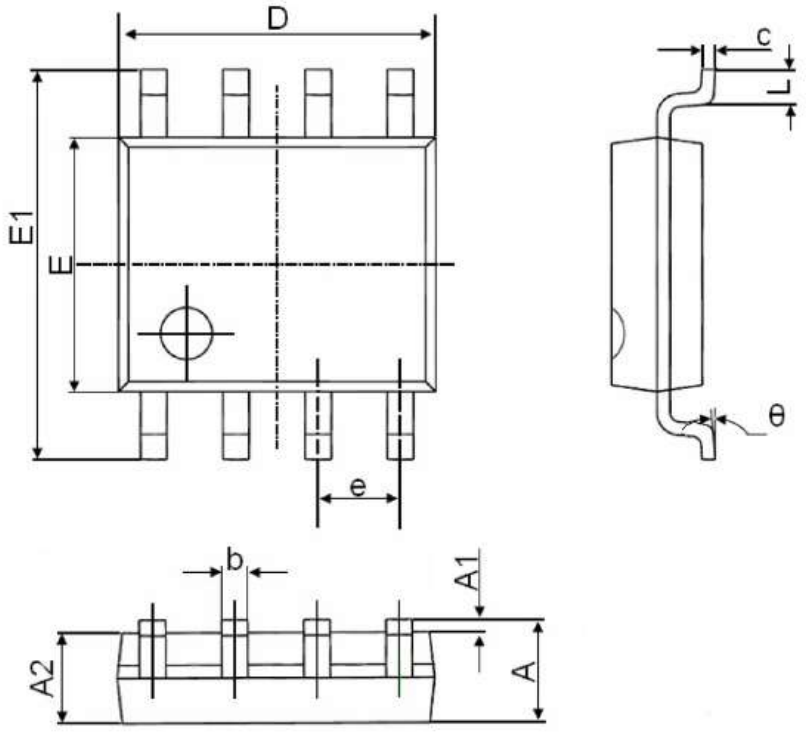


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 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°

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