MJ N-Channel and P-Channel Enhancement Mode Power MOSFET

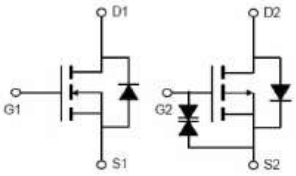
Description

The MJ01NP03S uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge.
This device is suitable for use in inverter and other applications.

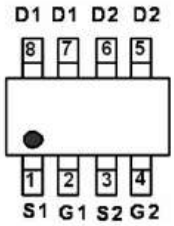
General Features

N-Channel	P-Channel
◆ V_{DS}=100V,I_D=3A	V_{DS}=-100V,I_D=-3A
$R_{DS(ON)}$<130mΩ @ V_{GS}=10V	$R_{DS(ON)}$<200mΩ @ V_{GS}=-10V
$R_{DS(ON)}$<140mΩ @ V_{GS}=4.5V	$R_{DS(ON)}$<230mΩ @ V_{GS}=-4.5V

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



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
MJ01NP03S	MJ01NP03S	SOP-8	Ø330mm	12mm	4000 units

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

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	100	-100	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Drain Current-Continuous (Note 2)	T_A=25°C	I_D	3	-3	A
	T_A=70°C	I_D	2.45	-2.45	A
Drain Current -Pulsed (Note 1)		I_{DM}	12	-12	A
Power Dissipation	T_A=25°C	P_D	2	2	W
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 To 150	-55 To 150	℃

Thermal Characteristic

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance,Junction-to-Ambient (Note 2) (N-channel)	$R_{\theta JA}$	-	62.5	℃/W
Thermal Resistance,Junction-to-Ambient (Note 2) (P-channel)	$R_{\theta JA}$	-	62.5	℃/W

N-channel Electrical Characteristics (T_C=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	100	110	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,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	1.0	1.5	2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=3A	-	95	130	mΩ
		V_{GS}=4.5V, I_D=3A	-	100	140	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=3A	3.5	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS}=50V,V_{GS}=0V F=1.0MHz	-	730	-	PF
Output Capacitance	C_{oss}		-	37	-	PF
Reverse Transfer Capacitance	C_{rss}		-	27	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=50V, R_L=15Ω V_{GS}=10V,R_G=2.5Ω	-	11	-	nS
Turn-on Rise Time	t_r		-	7.4	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	35	-	nS
Turn-Off Fall Time	t_f		-	9.1	-	nS
Total Gate Charge	Q_g	V_{DS}=50V,I_D=3A V_{GS}=10V	-	21.5	-	nC
Gate-Source Charge	Q_{gs}		-	3.2	-	nC
Gate-Drain Charge	Q_{gd}		-	6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=3A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	3	A
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=3A di/dt=100A/μs (Note3)	-	26	-	nS
Reverse Recovery Charge	Q_{rr}		-	27	-	nC
Forward Turn-On Time	ton	Intrinsic turn-on time is negligible(turn-on is dominated by LS+LD)				

Notes:

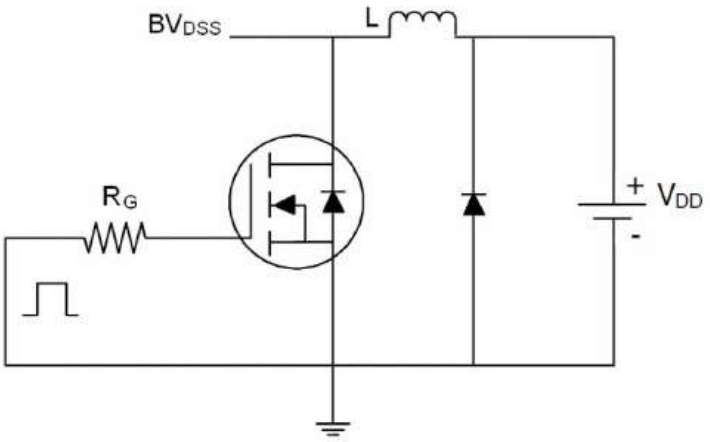
① Repetitive Rating: Pulse width limited by maximum junction temperature.

② The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design.Surface Mounted on FR4 Board, t ≤ 10 sec. The current rating is based on the t ≤10s thermal resistance rating.

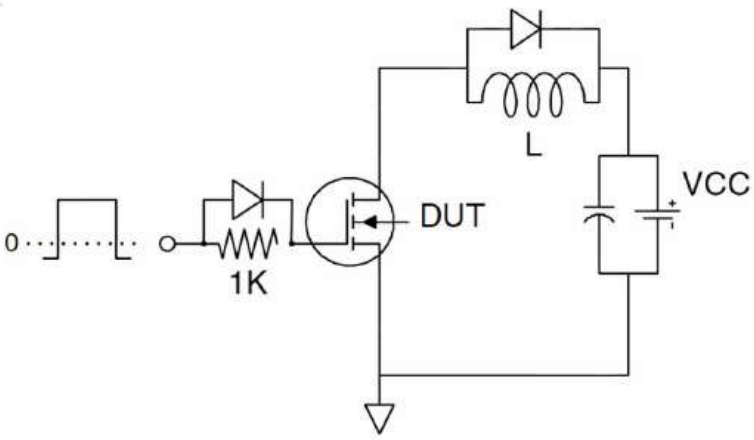
③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

④ Guaranteed by design, not subject to production

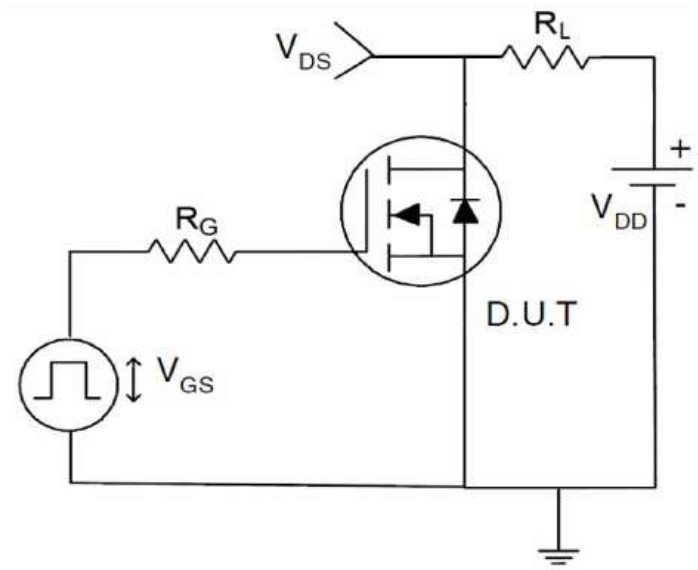
Test circuit



EAS test Circuit



Gate charge test Circuit



Switch Time Test Circuit

N-channelTypical Electrical and Thermal Characteristics (Curves)

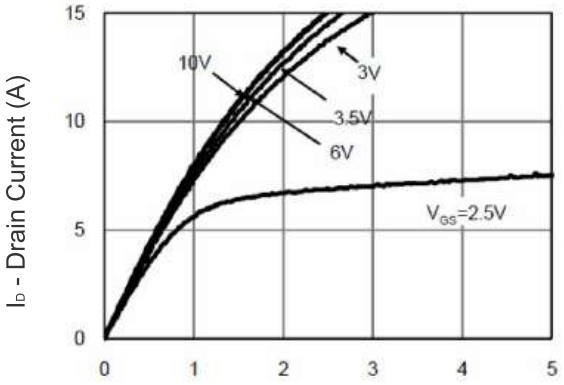


Figure 1 Output Characteristics

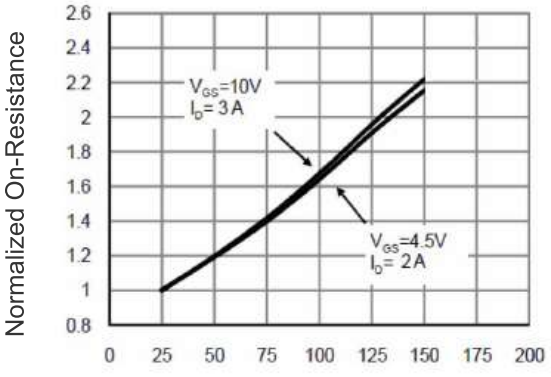


Figure 4 Rdson-Junction Temperature

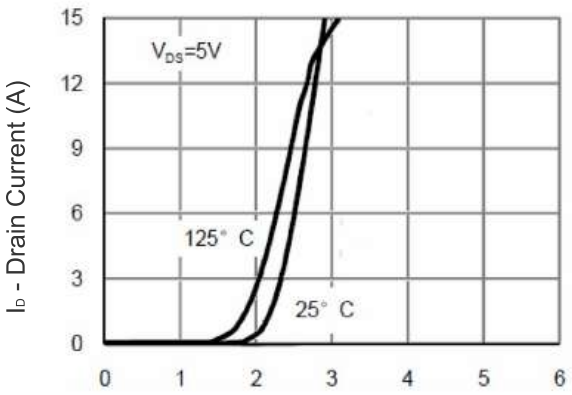


Figure 2 Transfer Characteristics

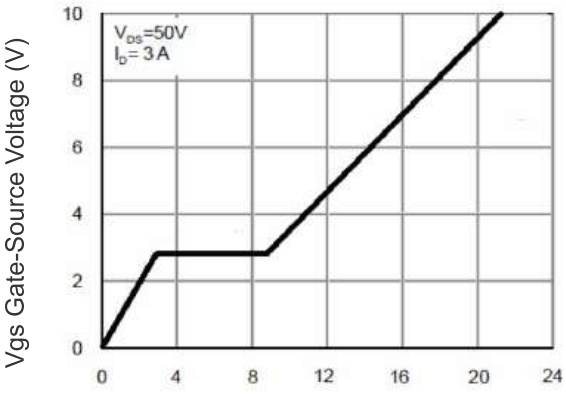


Figure 5 Gate Charge

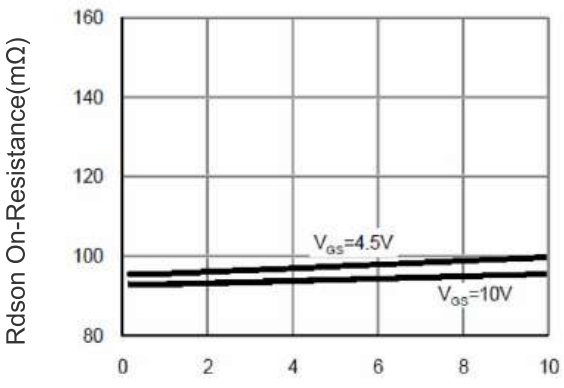


Figure 3 Rdson- Drain Current

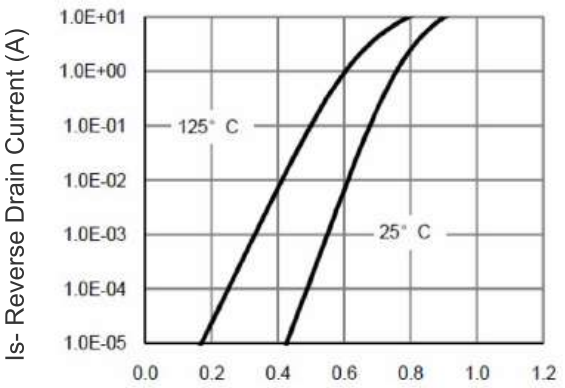


Figure 6 Source- Drain Diode Forward

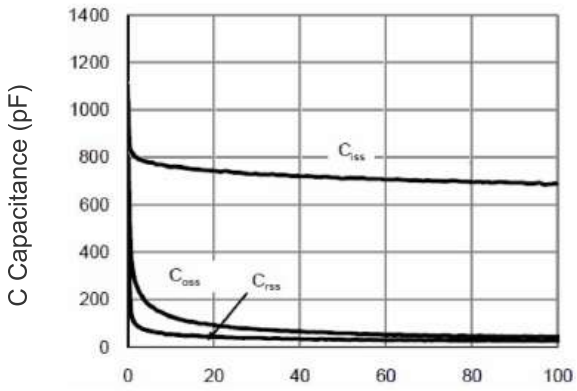


Figure 7 Capacitance vs Vds

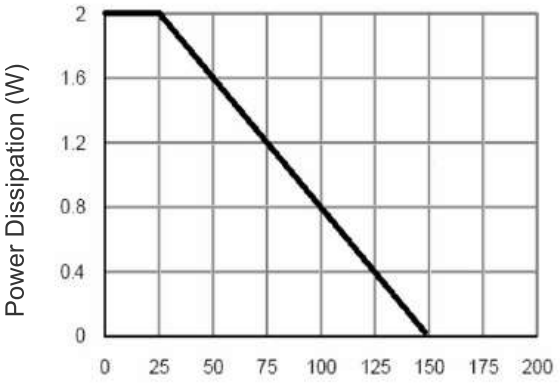


Figure 9 Power De-rating

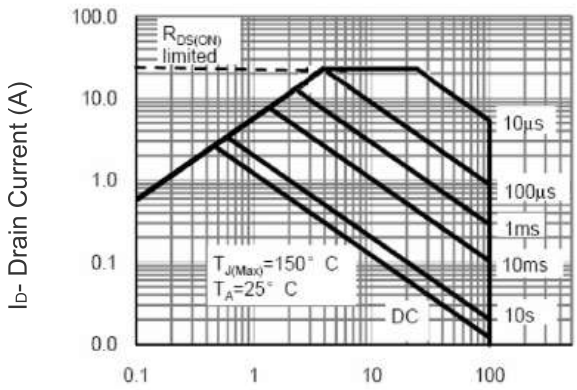


Figure 8 Safe Operation Area

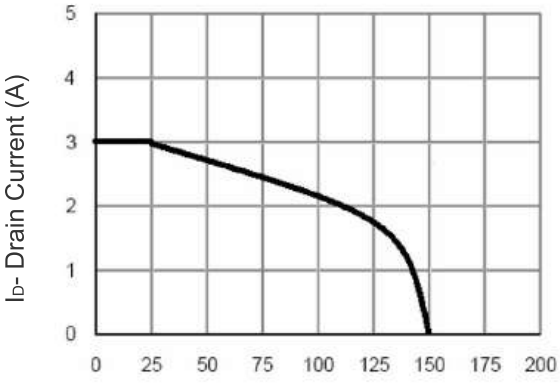


Figure 10 Current De-rating

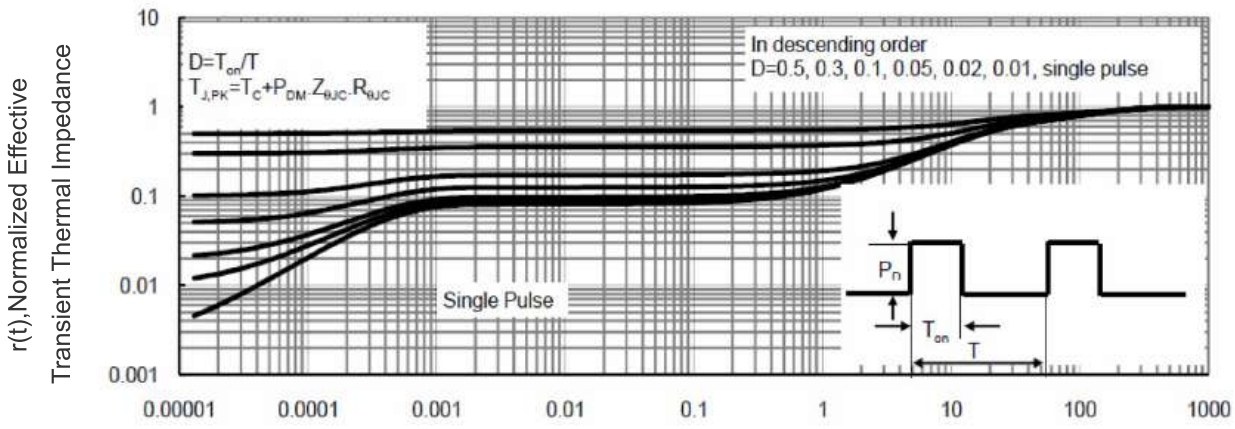


Figure 11 Normalized Maximum Transient Thermal Impedance

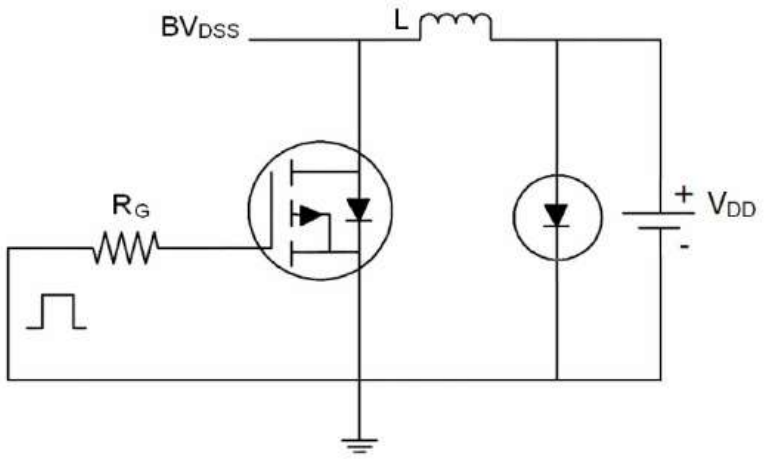
P-channel Electrical Characteristics (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-100V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS}=±20V,V_{DS}=0V	-	-	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} ,I_D=-250μA	-1	-1.9	-3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-3A	-	170	200	mΩ
		V_{GS}=-4.5V, I_D=-2A	-	200	230	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-3A	2	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS}=-25V,V_{GS}=0V, F=1.0MHz	-	760	-	PF
Output Capacitance	C_{oss}		-	260	-	PF
Reverse Transfer Capacitance	C_{rss}		-	170	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-50V,I_D=-3A V_{GS}=-10V,R_{GEN}=9Ω	-	14	-	nS
Turn-on Rise Time	t_r		-	18	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	50	-	nS
Turn-Off Fall Time	t_f		-	18	-	nS
Total Gate Charge	Q_g	V_{DS}=-50V,I_D=-3A V_{GS}=-10V	-	25	-	nC
Gate-Source Charge	Q_{gs}		-	5	-	nC
Gate-Drain Charge	Q_{gd}		-	7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-3A	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-3	A
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=-3A di/dt=100A/μs (Note 3)	-	35	-	nS
Reverse Recovery Charge	Q_{rr}		-	46	-	nC
Forward Turn-On Time	ton	Intrinsic turn-on time is negligible(turn-on is dominated by LS+LD)				

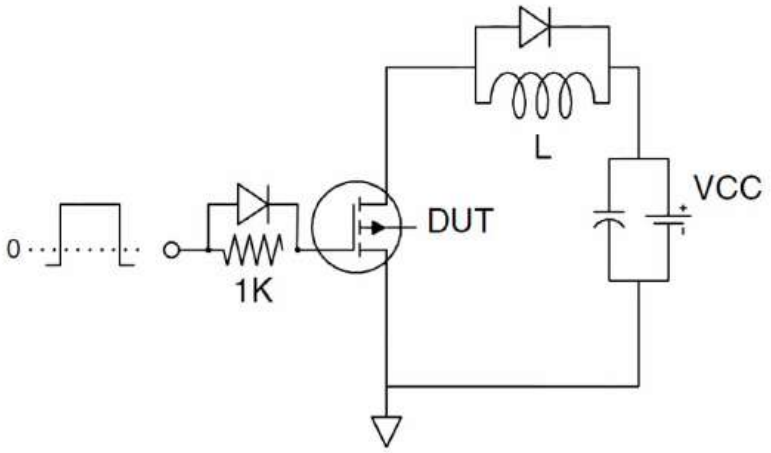
Notes:

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
⑤ EAS condition: Tj=25℃,V_{DD}=-50V,V_G=-10V,L=0.5mH,Rg=25Ω.

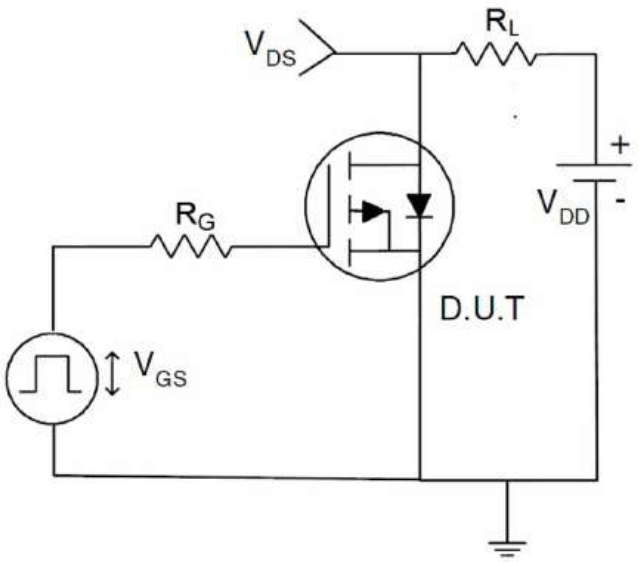
Test circuit



EAS test Circuit



Gate charge test Circuit



Switch Time Test Circuit

Typical Electrical and Thermal Characteristics (Curves)

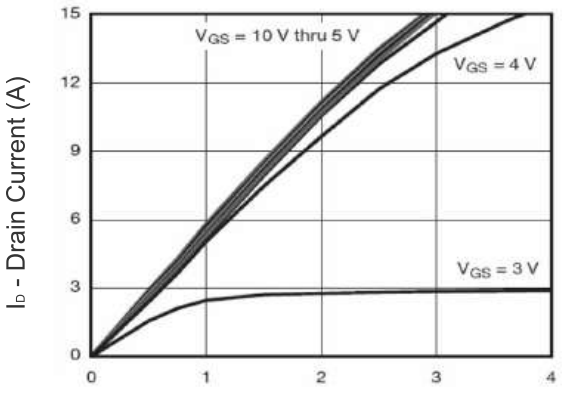


Figure 1 Output Characteristics

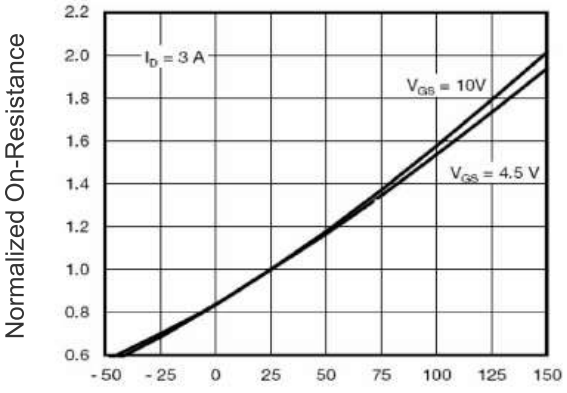


Figure 4 Rdson-Junction Temperature

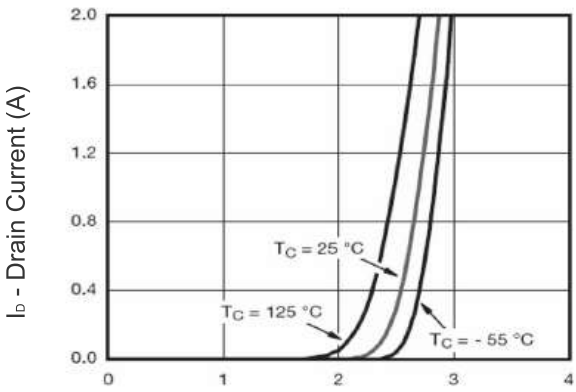


Figure 2 Transfer Characteristics

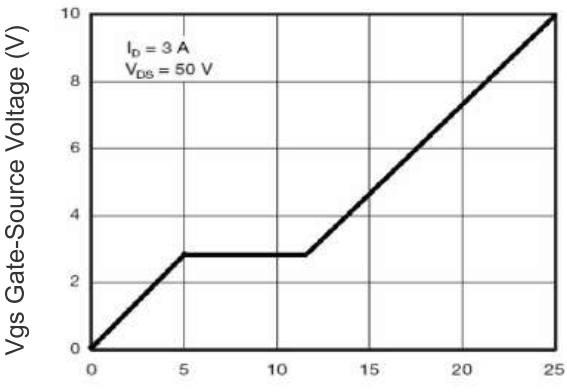


Figure 5 Gate Charge

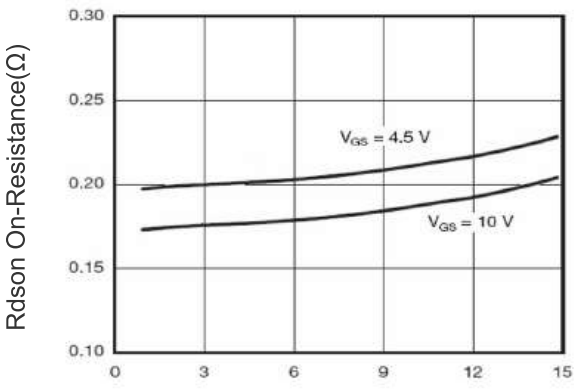


Figure 3 Rdson- Drain Current

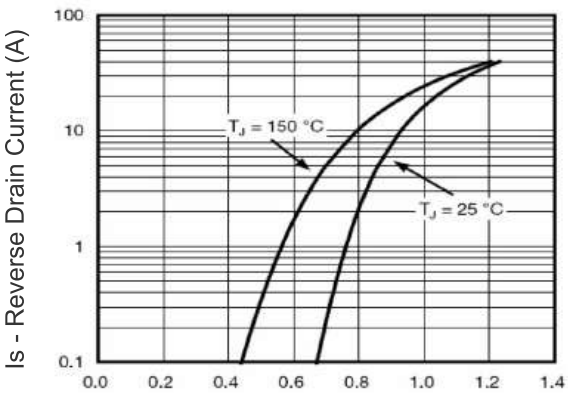


Figure 6 Source- Drain Diode Forward

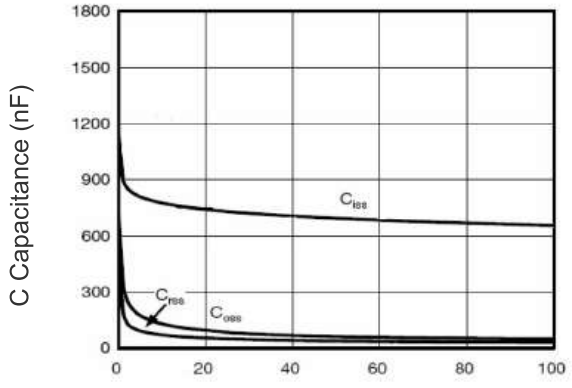


Figure 7 Capacitance vs Vds

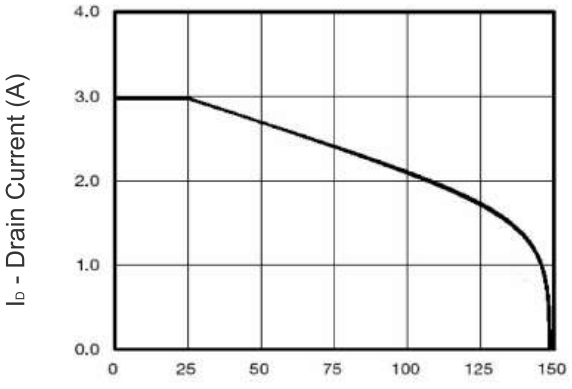


Figure 9 Drain Current vs Case Temperature

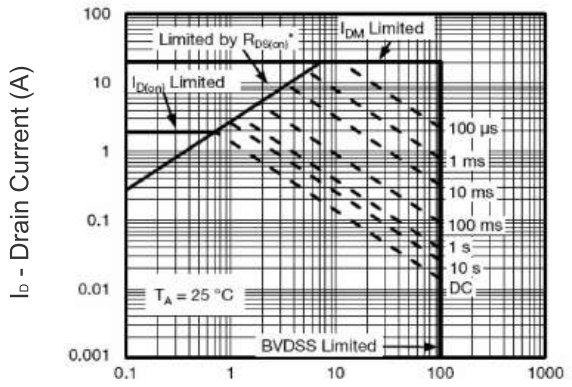


Figure 8 Safe Operation Area

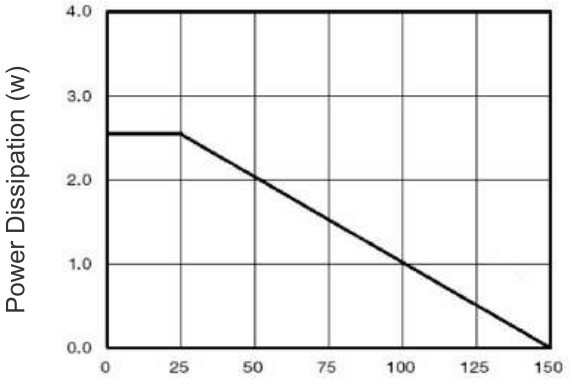


Figure 10 Power De-rating

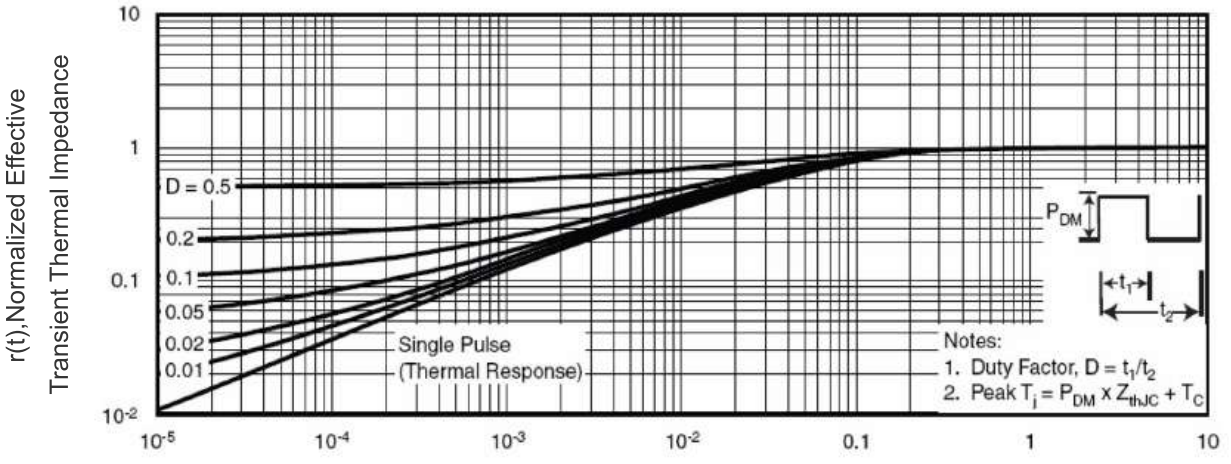
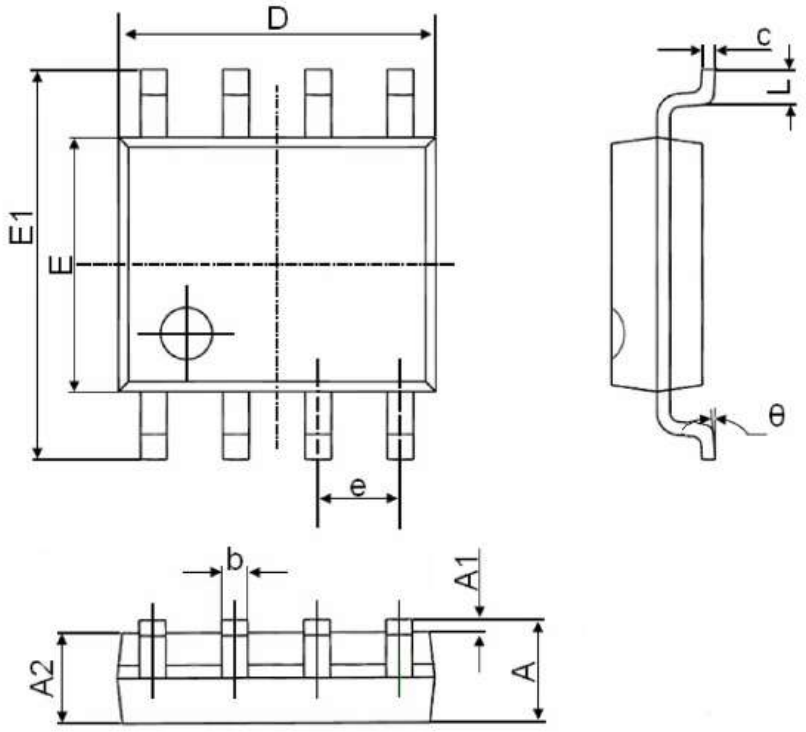


Figure 11 Normalized Maximum Transient Thermal Impedance

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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