MT8308N3

30V Complementary Power MOSFET

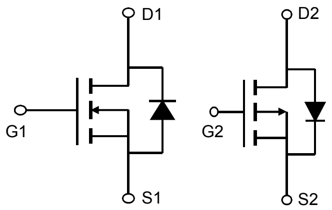
MT Semiconductor®

http://www.mtsemi.com

Features

- N-Channel
  30V/15A
  R_{DS}(ON) = 8mΩ (typ) @ VGS = 10V
  R_{DS}(ON) = 11mΩ (typ) @ VGS = 4.5V
- P-Channel
  -30V/-16A
  R_{DS} (ON) = 14mΩ (typ) @ VGS = -10V
  R_{DS} (ON) = 23mΩ (typ) @ VGS = -4.5V
- RoHS Compliant

Simplified Schematic

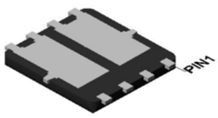


General Description

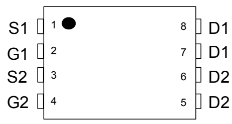
This complementary MOSFET device is produced using Mos-tech's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

MARKING DIAGRAM & PIN ASSIGNMENT

DFN3X3-8L



Top View



Applications

- DC-DC converter
- Power management
- LCD backlight inverter

Absolute Maximum Ratings

Symbol	Parameter	N-CH	P-CH	Units
V_{DSS}	Drain-Source Voltage	30	-30	V
V_{GSS}	Gate-Source Voltage	± 20	± 20	V
I_D	Drain Current - Continuous (Note 1a)	15	-16	A
	- Pulsed	30	-32	
P_D	Power Dissipation for Dual Operation	15		W
	Power Dissipation for Single Operation (Note 1a)	2.3		
	(Note 1b)	1.9		
	(Note 1c)	2.1		
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	75	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	45	°C/W

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Type	Min	Typ	Max	Units
Off Characteristics							
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA V_{GS} = 0 V, I_D = –250 μA	N-CH P-CH	30 -30	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C I_D = –250 μA, Referenced to 25°C	N-CH P-CH	-	21 -13	-	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 30V, V_{GS} = 0 V V_{DS} = -30V, V_{GS} = 0 V	N-CH P-CH	-	-	1 –1	μA
I_{GSS}	Gate-Body Leakage	$_{GS}$ = ±20 V, V_{DS} = 0 V V_{GS} = ±20 V, V_{DS} = 0 V	N-CH P-CH	-	-	±100 ±100	nA
On Characteristics (Note 2)							
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA V_{DS} = V_{GS}, I_D = –250 μA	N-CH P-CH	1 -1	1.5 -1.6	2.5 -2.8	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C I_D = –250 μA, Referenced to 25°C	N-CH P-CH	-	-3.6 -3.6	-	mV/°C
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}= 10V,I_D=4.0A V_{GS}=4.5V,I_D=3.0A	N-CH	- -	8 11	13 19	mΩ
		V_{GS}= -10V,I_D=-3.0A V_{GS}=-4.5V,I_D=-2.0A	P-CH	- -	14 23	22 32	
$I_{D(on)}$	On-State Drain Current	V_{GS} = 10 V, V_{DS} = 5 V V_{GS} = –10 V, V_{DS} = –5 V	N-CH P-CH	15 -16	-	-	A
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 4.5 A V_{DS} = –5 V, I_D = -3.5 A	N-CH P-CH	-	23 19	-	S
Dynamic Characteristics							
C_{iss}	Input Capacitance	N-CH V_{DS} = 10 V, V_{GS} = 0 V, f = 1.0 MHz P-CH V_{DS} = -10 V, V_{GS} = 0 V, f = 1.0 MHz	N-CH P-CH	-	653 102	-	pF
C_{oss}	Output Capacitance		N-CH P-CH	-	58 36	-	pF
C_{rss}	Reverse Transfer Capacitance		N-CH P-CH	-	96 55	-	pF
Switching Characteristics (Note 2)							
$t_{d(on)}$	Turn-On Delay Time	N-CH V_{DD} = 10 V, I_D = 1 A, V_{GS} = 10 V, R_{GEN} = 1 Ω P-CH V_{DD} = -10 V, I_D = –1 A, V_{GS} = -10 V, R_{GEN} = 1 Ω	N-CH P-CH	-	8 9	-	ns
t_r	Turn-On Rise Time		N-CH P-CH	-	8.6 17	-	ns
$t_{d(off)}$	Turn-Off Delay Time		N-CH P-CH	-	23 28	-	ns
t_f	Turn-Off Fall Time		N-CH P-CH	-	8 13	-	ns
Q_g	Total Gate Charge	N-CH V_{DS} = 10 V, I_D = 4.5 A, V_{GS} = 10 V P-CH V_{DS} = -10 V, I_D = –3.5 A, V_{GS} = –10V	N-CH P-CH	-	26 20	-	nC
Q_{gs}	Gate-Source Charge		N-CH P-CH	-	1.9 1.6	-	nC
Q_{gd}	Gate-Drain Charge		N-CH P-CH	-	3.5 2.7	-	nC

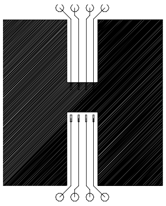
Electrical Characteristics (continued)

T_A = 25°C unless otherwise noted

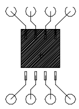
Symbol	Parameter	Test Conditions	Type	Min	Typ	Max	Units
Drain-Source Diode Characteristics and Maximum Ratings							
I_S	Maximum Continuous Drain-Source Diode Forward Current		N-CH P-CH	-	-	1.4 –1.4	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 1 A (Note 2) V_{GS} = 0 V, I_S = -3.5 A (Note 2)	N-CH P-CH	-	0.8 -0.9	-	V

Notes:

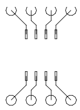
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 78°C/W when mounted on a 0.5 in² pad of 2 oz copper



b) 125°C/W when mounted on a .02 in² pad of 2 oz copper



c) 135°C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width < 300µs, Duty Cycle < 2.0%

TYPICAL CHARACTERISTICS P-CH

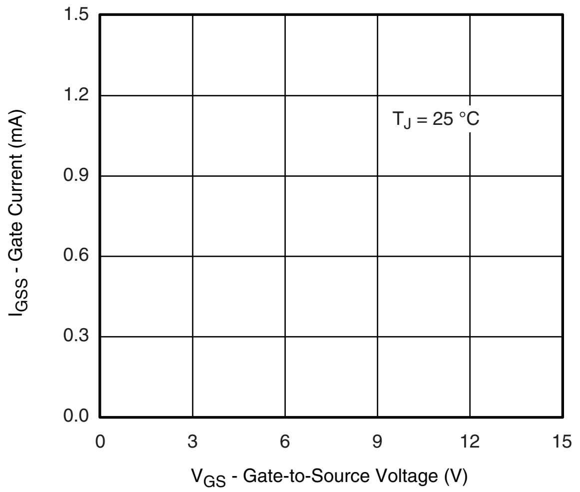


Figure 1 Gate Current vs. Gate-Source Voltage

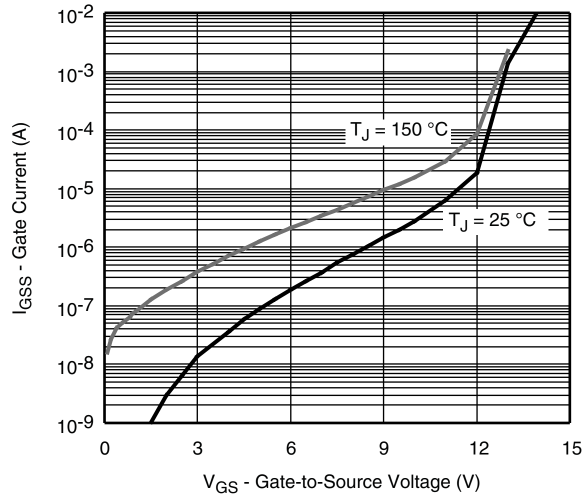


Figure 2 Gate Current vs. Gate-Source Voltage

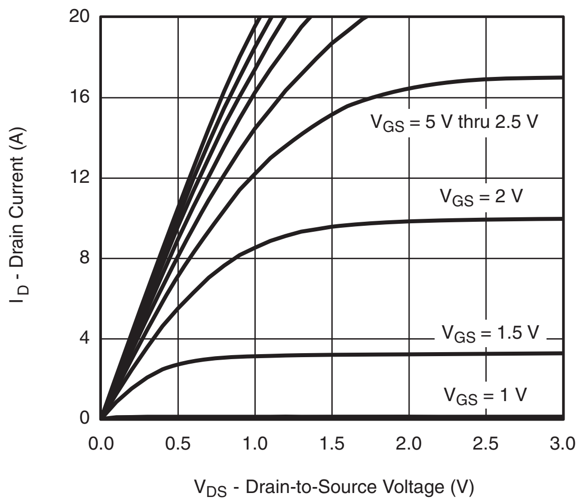


Figure 3 Output Characteristics

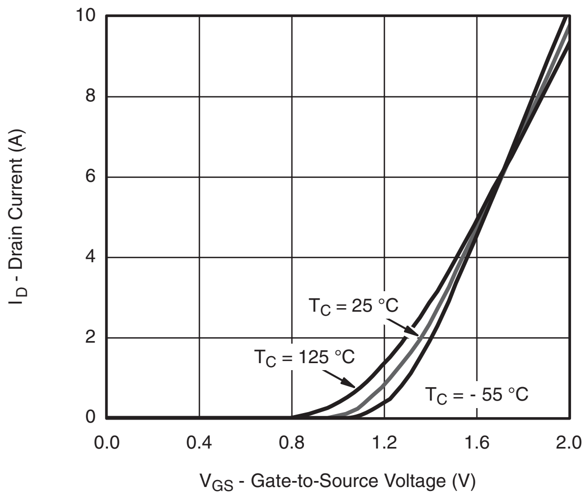


Figure 4 Transfer Characteristics

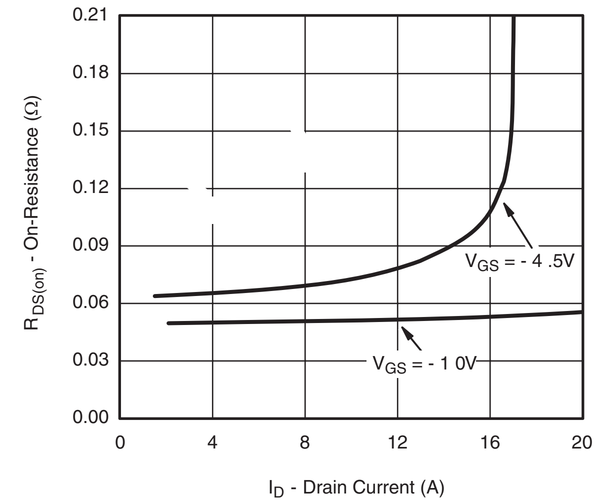


Figure 5 **On-Resistance vs. Drain Current**

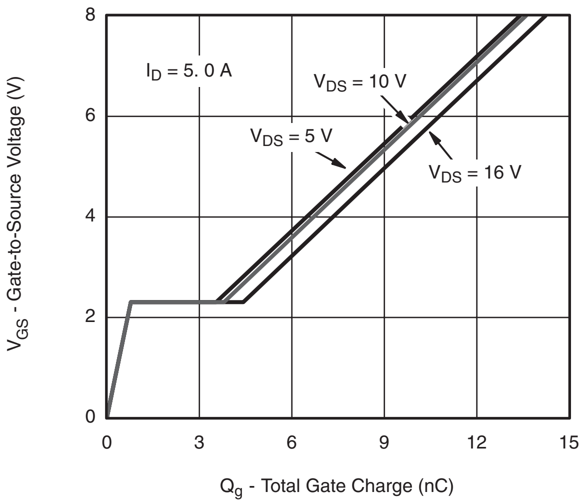


Figure 6 Gate Charge

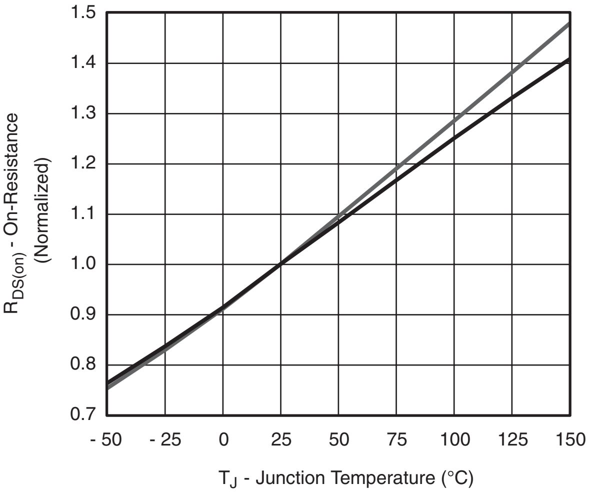


Figure 7 On-Resistance vs. Junction Temperature

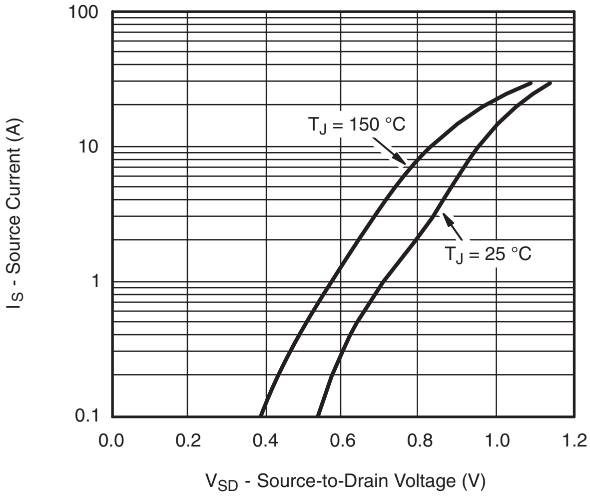


Figure 8 oure-Drain Diode Forward Voltage

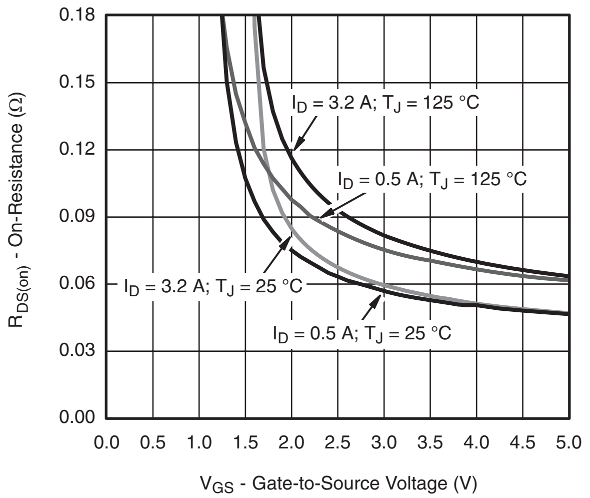


Figure 9 On Resistance VS. Gate-to-Source Voltage

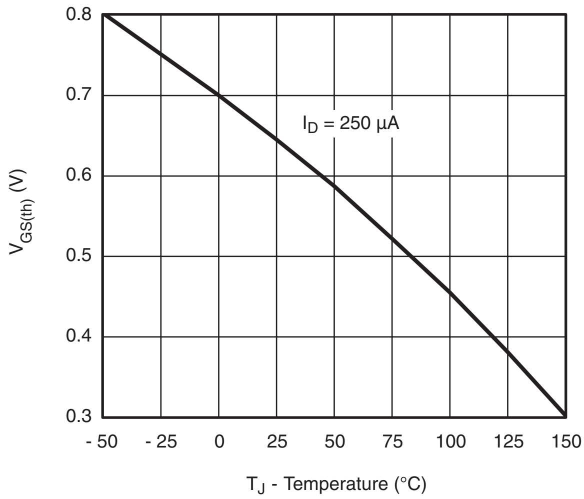


Figure 10 Threshold Voltage

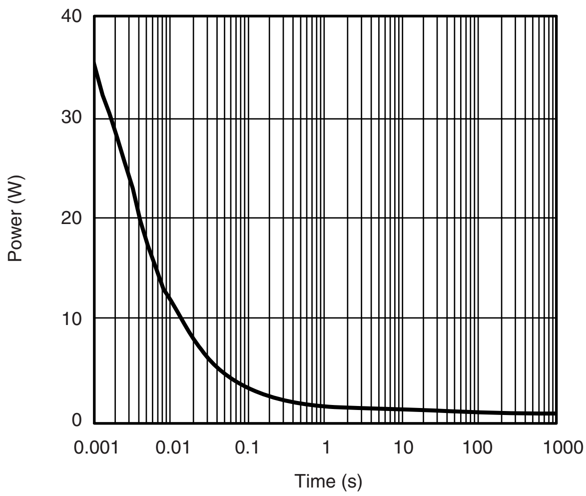


Figure 11 Single Pulse Power, Junction-to-Ambient

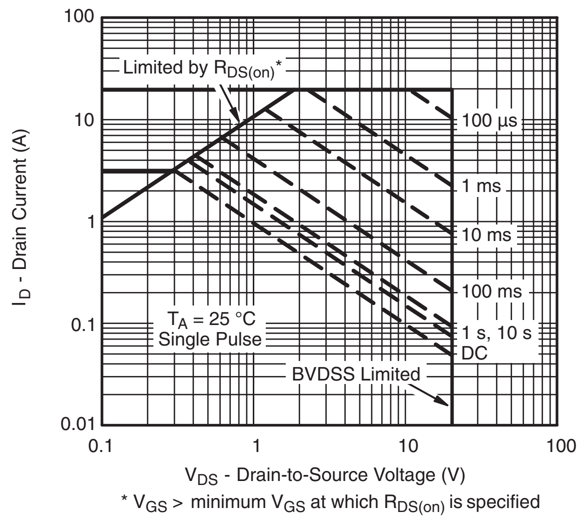


Figure 12 Safe Operating Area, Junction-to-Ambient

Typical Characteristics: N-CH

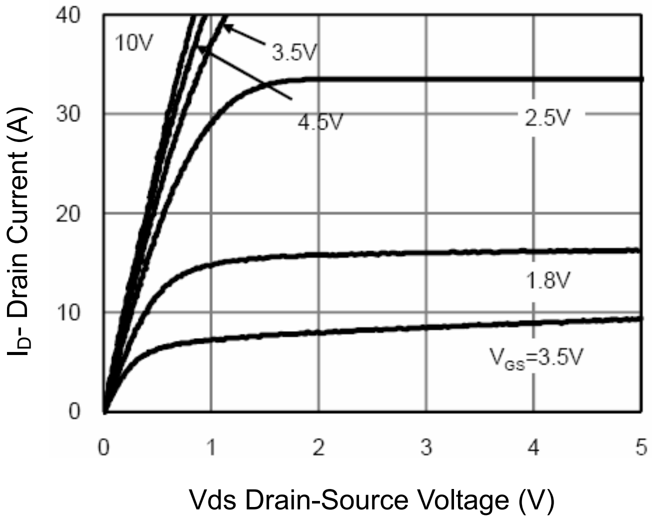


Figure 1 Output Characteristics

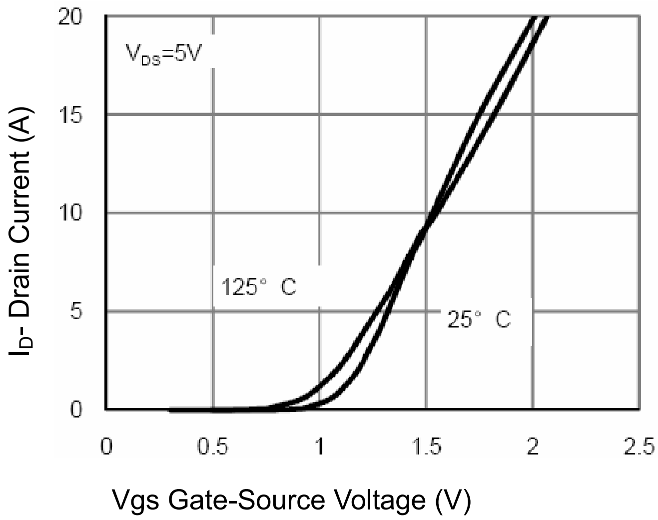


Figure 2 Transfer Characteristics

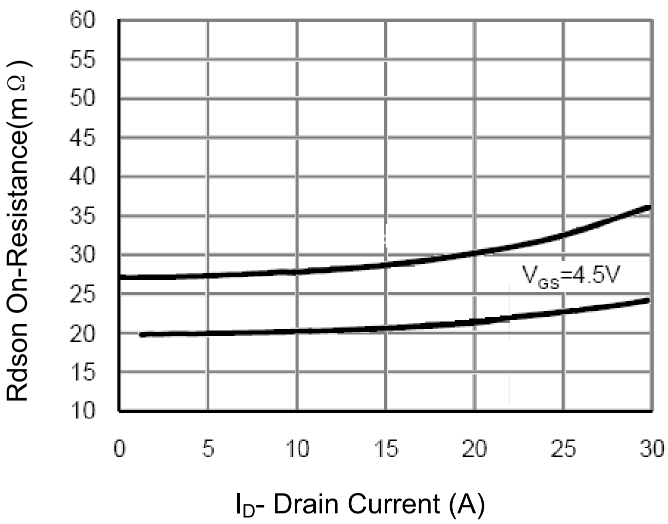


Figure 3 Drain-Source On-Resistance

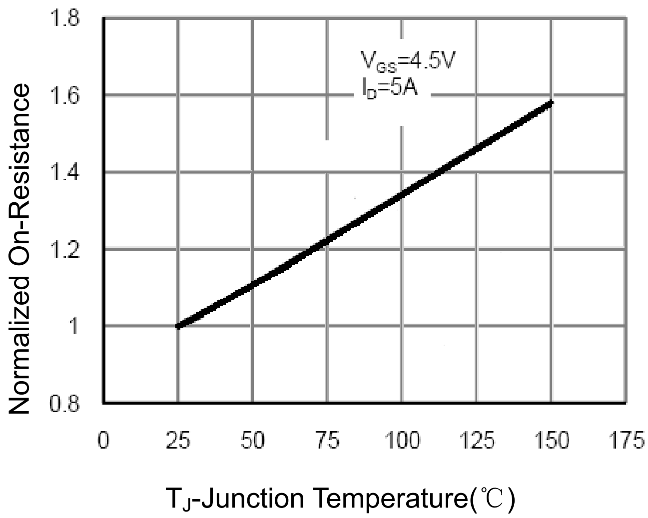


Figure 4 Drain-Source On-Resistance

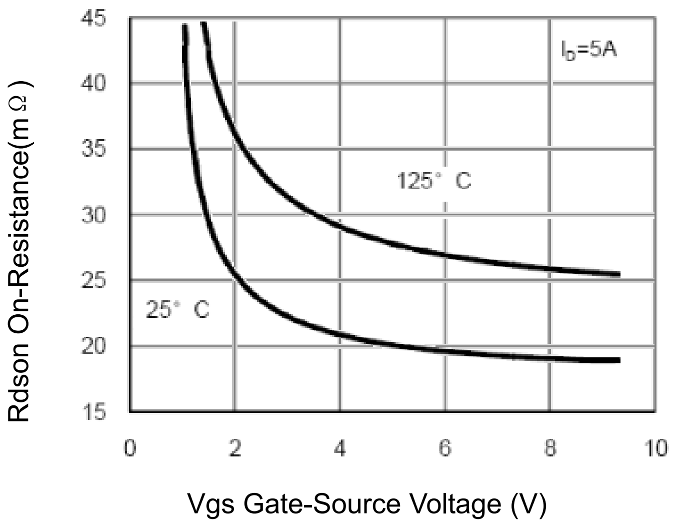
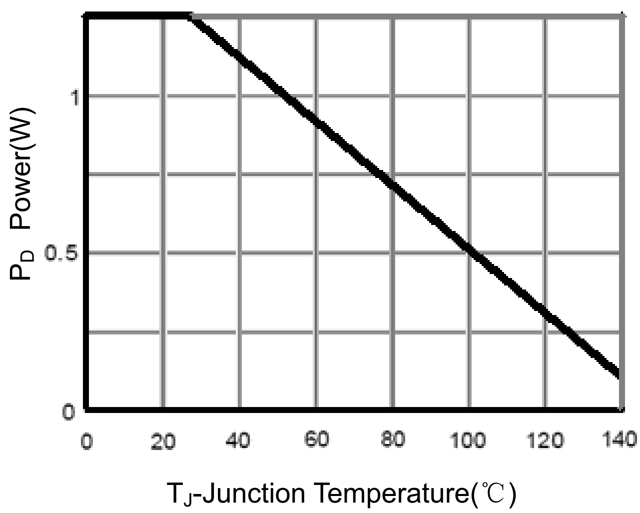


Figure5 Rdson vs Vgs



Typical Characteristics: N-CH

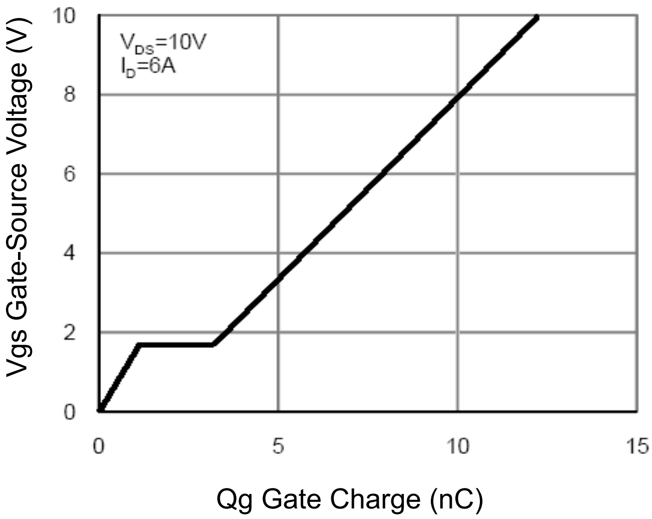


Figure 7 Gate Charge

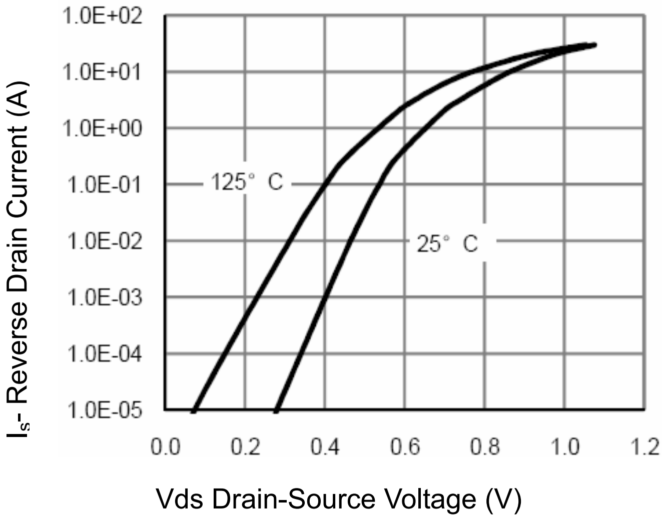


Figure 8 Source- Drain Diode Forward

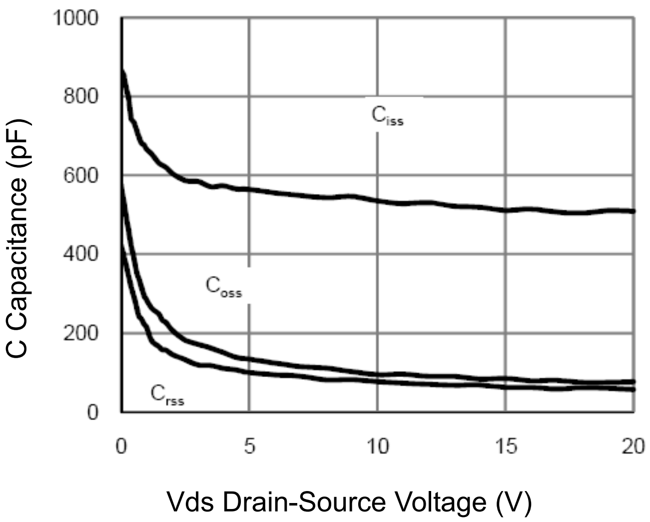


Figure 9 Capacitance vs Vds

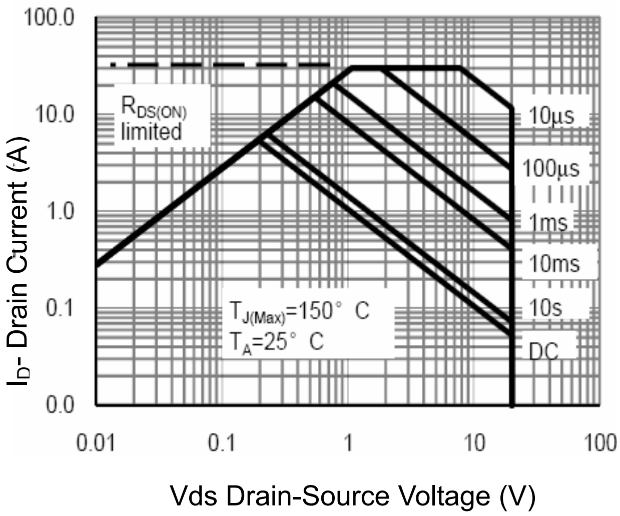


Figure 10 Safe Operation Area

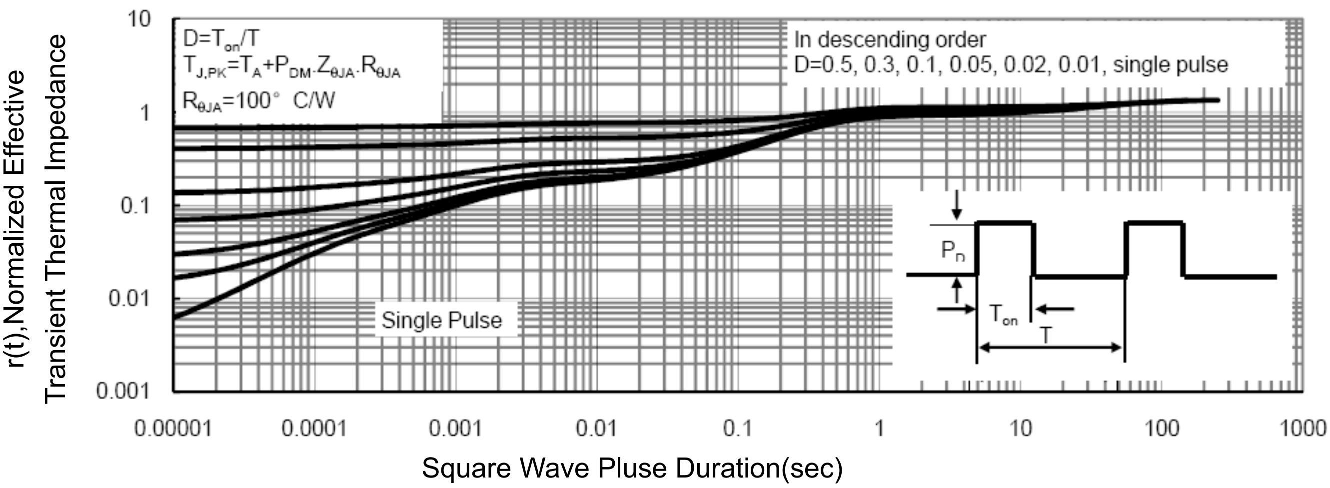
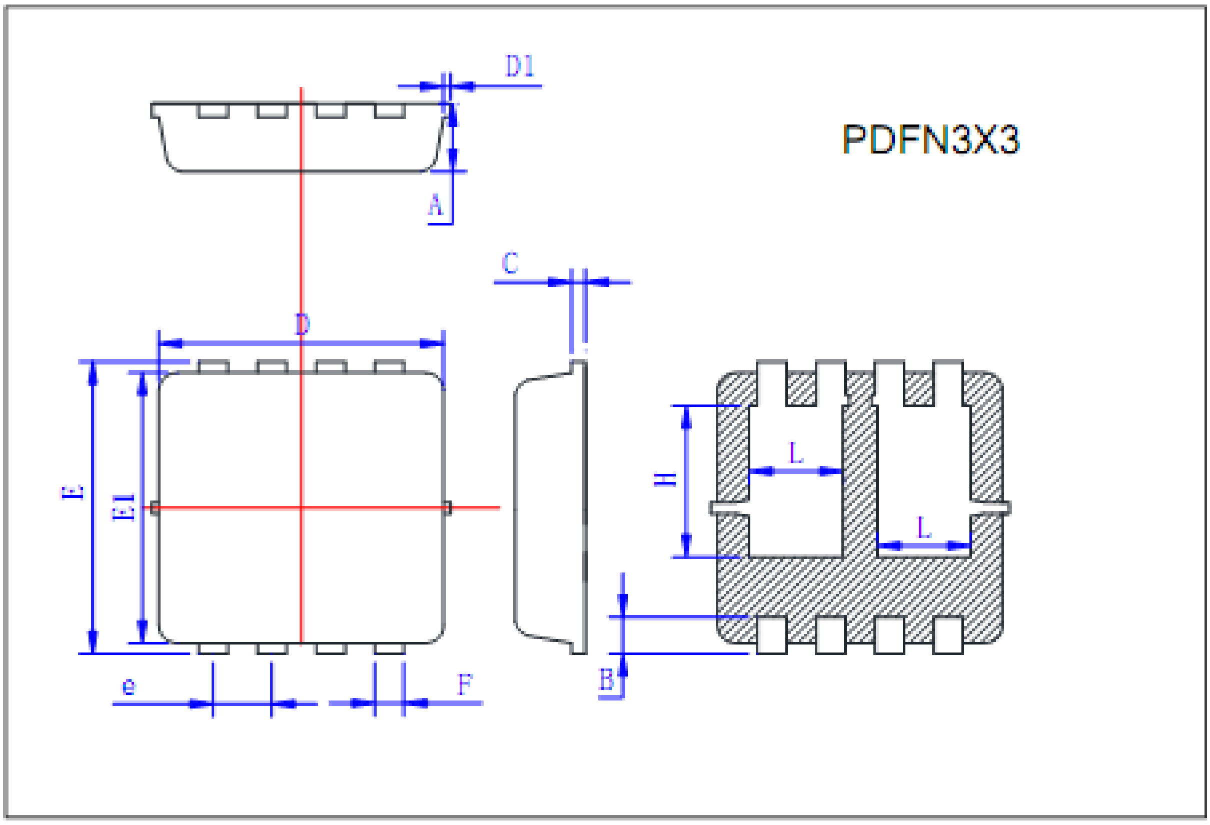


Figure 11 Normalized Maximum Transient Thermal Impedance



Symbol	Min	Typ	Max
A	0.725	0.775	0.825
B	0.28	0.38	0.48
C	0.13	0.15	0.20
D	3.05	3.15	3.25
D1			0.10
E	3.25	3.35	3.45
E1	3.0	3.1	3.2
e	0.60	0.65	0.70
F	0.27	0.32	0.37
H	1.63	1.73	1.83
L	0.93	1.03	1.13

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Keep safety first in your circuit designs!

1. MOS-TECH Semiconductor Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.