

MT3113

N-Channel Power MOSFET

125V, 130A, 7.7mΩ

Features

- Max $R_{DS(on)} = 7.7m\Omega$ at $V_{GS} = 10V$, $I_D = 50A$
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extr emely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

General Description

This N-Channel MOSFET is produced using MOS-TECH Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Applications

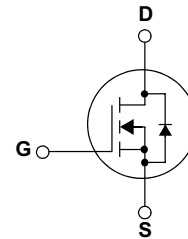
- DC-DC primary bridge
- DC-DC Synchronous rectification
- Hot swap



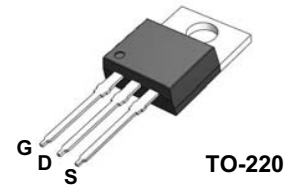
MT Semiconductor®

<http://www.mtsemi.com>

Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Unit
Common Ratings ($T_C = 25^\circ\text{C}$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	125	V
V_{GSS}	Gate-Source Voltage	± 25	
T_J	Maximum Junction Temperature	175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
I_S	Diode Continuous Forward Current	$T_C = 25^\circ\text{C}$ 130	A
Mounted on Large Heat Sink			
I_{DM}		$T_C = 25^\circ\text{C}$ 410**	A
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$ 130	A
		$T_C = 100^\circ\text{C}$ 93	
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$ 278	W
		$T_C = 100^\circ\text{C}$ 139	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.54	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62.5	
Avalanche Ratings			
E_{AS}	Avalanche Energy, Single Pulsed	$L = 0.5\text{mH}$ 720***	mJ

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT3113	MT3113	TO-220	-	-	50

Electrical Characteristics ($T_c = 25^\circ\text{C}$ Unless Otherwise Noted)

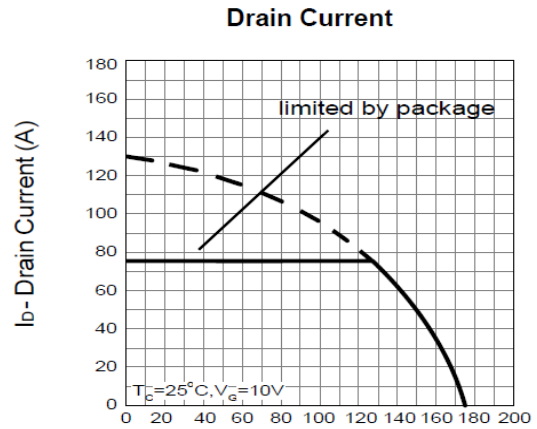
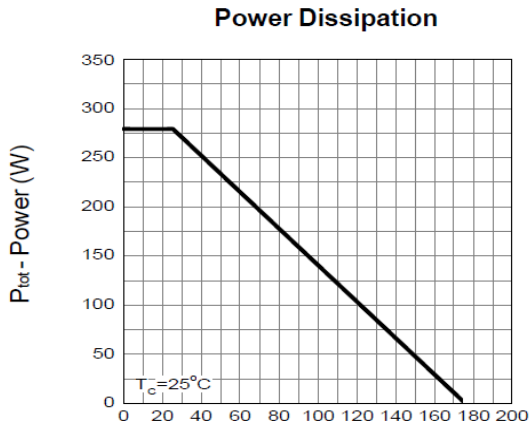
Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	125		-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=125V, V_{GS}=0V$ $T_J=85^\circ\text{C}$	-	-	1	μA
			-	-	10	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2.0	3.0	4.0	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$	-	-	± 100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=65A$	-	7.7	9.0	m Ω
Diode Characteristics						
V_{SD}	Diode Forward Voltage	$I_{SD}=65A, V_{GS}=0V$	-	0.8	1	V
t_{rr}	Reverse Recovery Time	$I_{SD}=65A, di_{SD}/dt=100A/\mu s$	-	65	-	ns
Q_{rr}	Reverse Recovery Charge		-	103	-	nC

Electrical Characteristics (Cont.) ($T_c = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
Dynamic Characteristics						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	1.9	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Frequency=1.0MHz	-	5896	-	pF
C_{oss}	Output Capacitance		-	940	-	
C_{riss}	Reverse Transfer Capacitance		-	432	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=62.5V, R_G=6\Omega,$ $I_{DS}=65A, V_{GS}=10V,$	-	23	-	ns
T_r	Turn-on Rise Time		-	39	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	86	-	
T_f	Turn-off Fall Time		-	46	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	$V_{DS}=100V, V_{GS}=10V,$ $I_{DS}=65A$	-	130	-	nC
Q_{gs}	Gate-Source Charge		-	25	-	
Q_{gd}	Gate-Drain Charge		-	42	-	

Note * : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

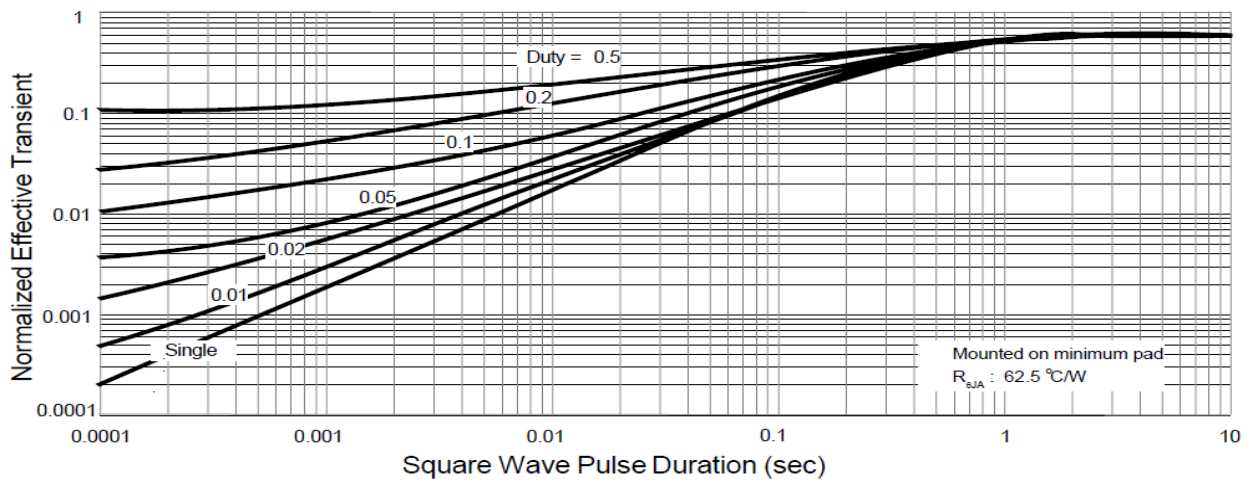
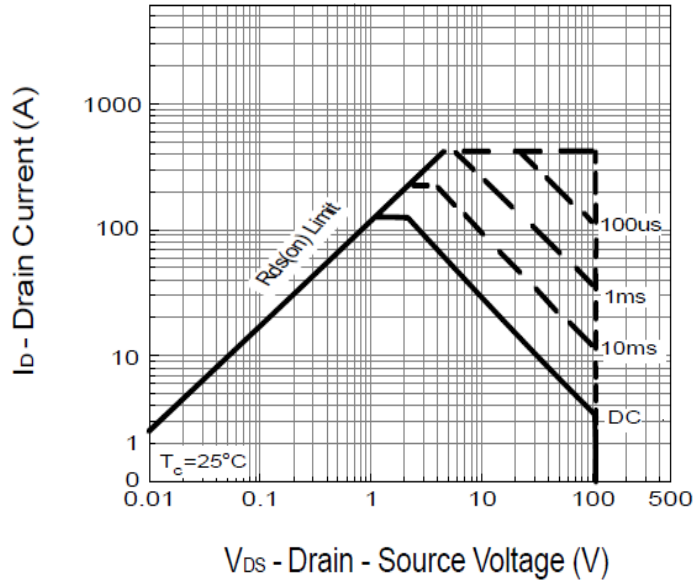
Typical Operating Characteristics



T_c - Case Temperature ($^{\circ}C$)

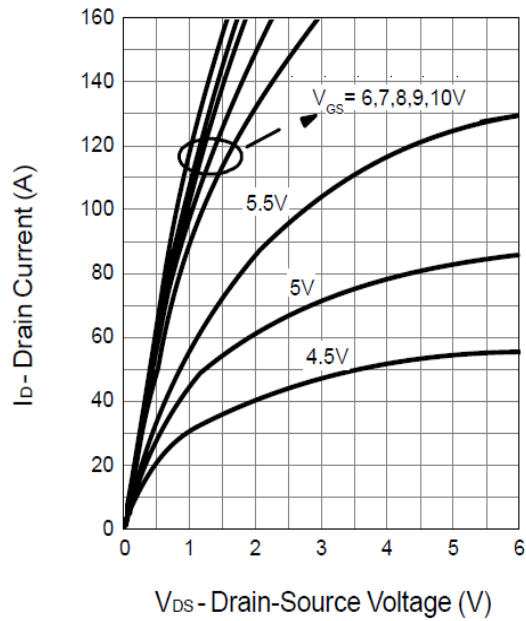
T_c - Case Temperature ($^{\circ}C$)

Safe Operation Area

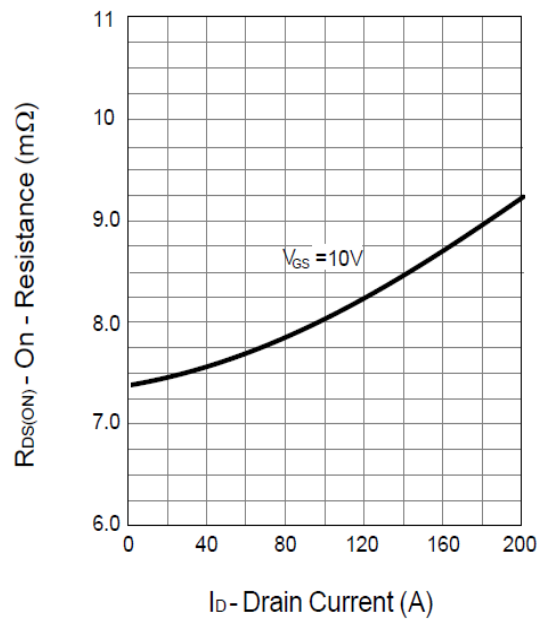


Typical Operating Characteristics (Cont.)

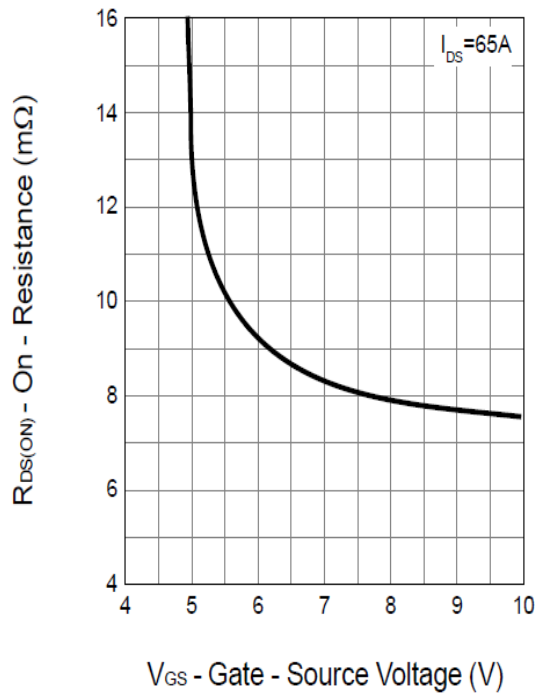
Output Characteristics



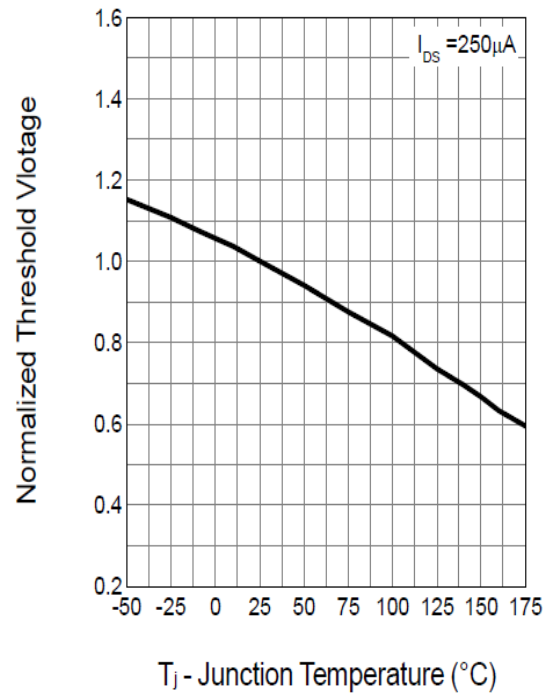
Drain-Source On Resistance



Drain-Source On Resistance

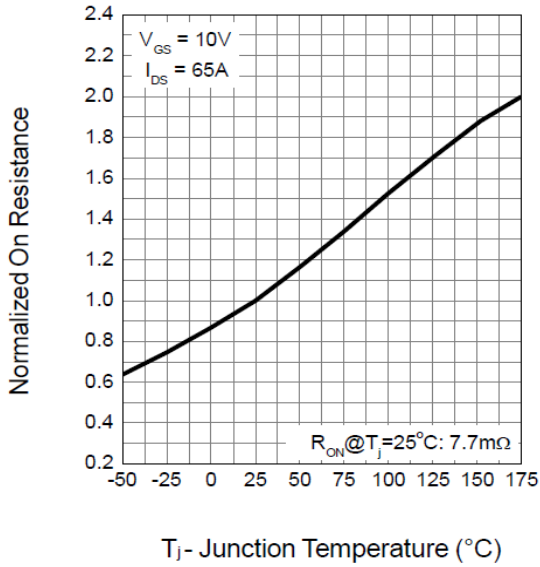


Gate Threshold Voltage

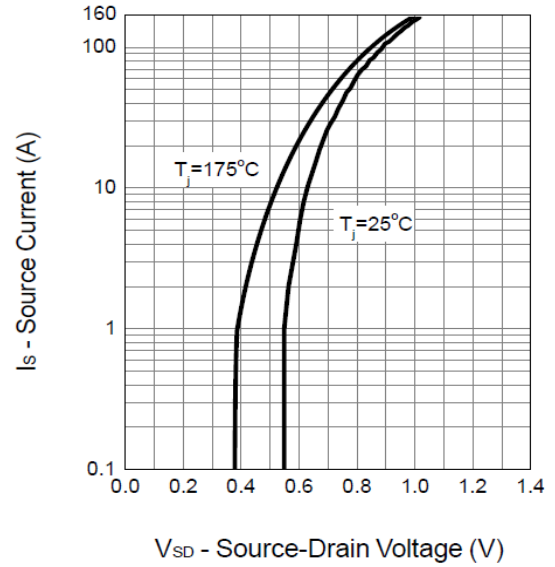


Typical Operating Characteristics (Cont.)

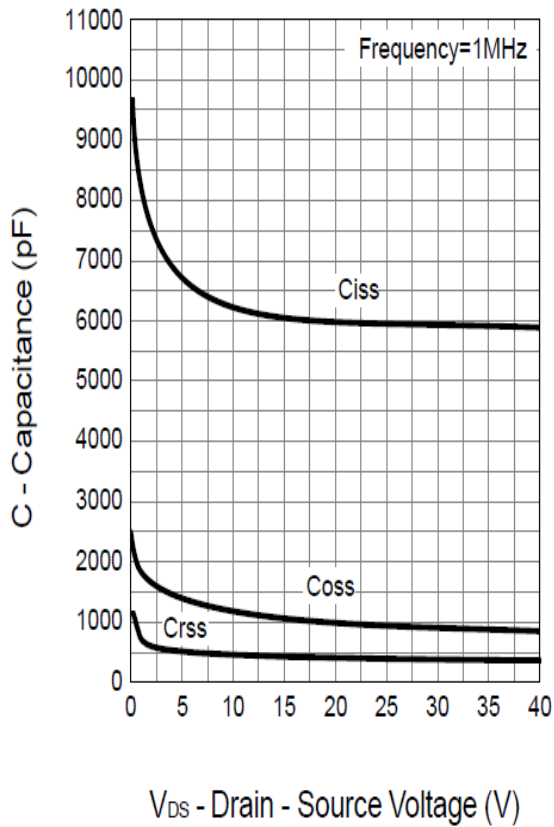
Drain-Source On Resistance



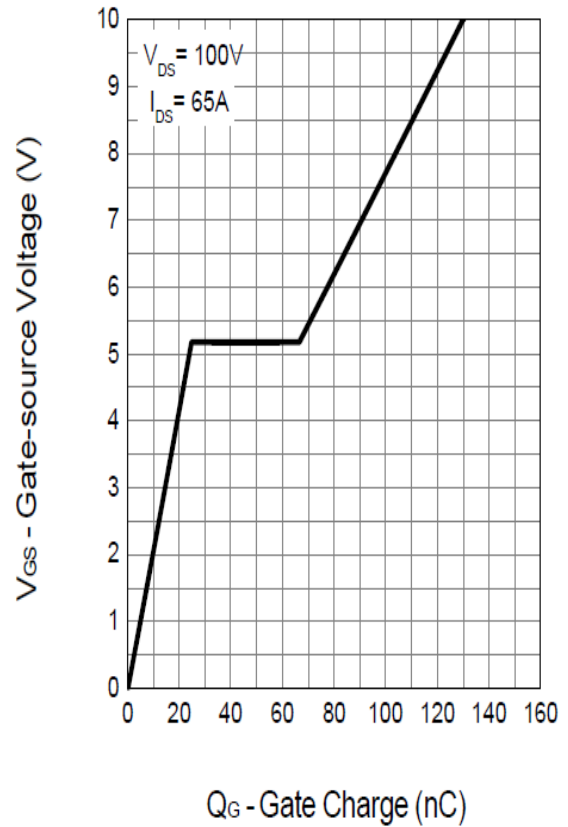
Source-Drain Diode Forward



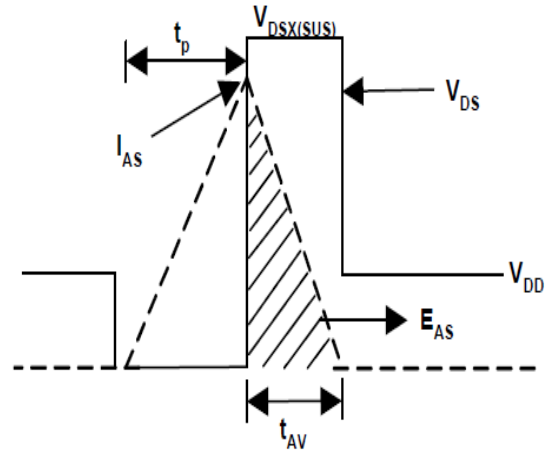
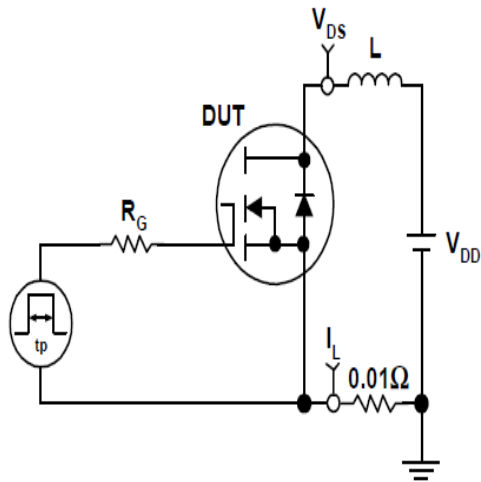
Capacitance



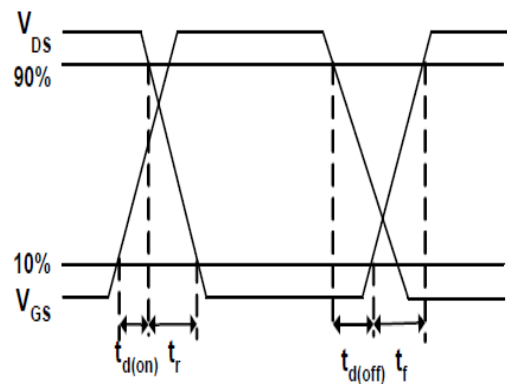
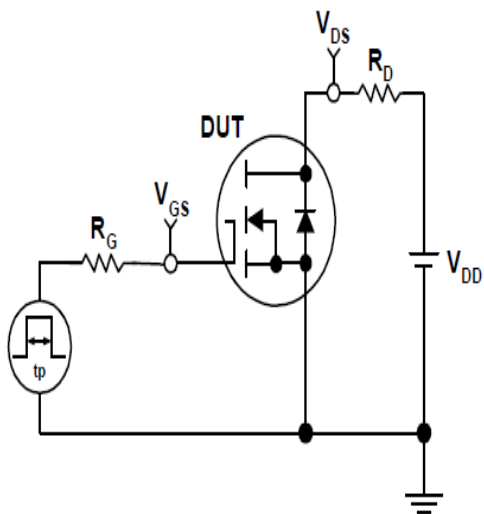
Gate Charge



Avalanche Test Circuit and Waveforms



Avalanche Test Circuit and Waveforms



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