

MT19N10E

N-Channel 100V Power MOSFET

Features

- Max $R_{DS(on)}=100m\Omega$ at $V_{GS}=10V, I_D=8A$
- Fast Switching Speed
- Low Gate Charge
- High Power and Current Handling Capability
- ESD Rating:2000V HBM

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. It is ESD Protected.

Applications

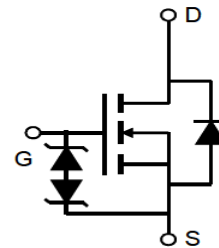
- DC-DC primary bridge
- DC-DC Synchronous rectification
- DC FAN



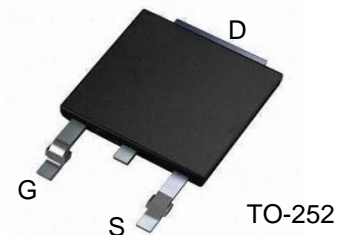
MT Semiconductor®

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Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



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

Symbol	Parameter	Ratings	Units	
V_{DSS}	Drain to Source Voltage	100	V	
V_{GSS}	Gate to Source Voltage	± 20	V	
I_D	Drain Current - Continuous (Silicon Limited) $T_C = 25^\circ\text{C}$	15.6	A	
	- Continuous (Package Limited) $T_C = 25^\circ\text{C}$	8.5		
	- Continuous $T_C = 25^\circ\text{C}$ (Note 1a)	45		
	- Pulsed	62.4		
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	25	mJ	
P_D	Power Dissipation	- $T_C = 25^\circ\text{C}$ (Note 1a)	50	W
		- $T_A = 25^\circ\text{C}$ (Note 1b)	0.4	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$	

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	3.5	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	55	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT19N10E	MT19N10E	TO-252	-	-	2500

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	100	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.09	--	V°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 80\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1.0	--	2.9	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 7.8\text{ A}$	--	0.075	0.10	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 30\text{ V}, I_D = 7.8\text{ A}$ (Note 4)	--	11	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	620	810	pF
C_{oss}	Output Capacitance		--	120	200	pF
C_{rSS}	Reverse Transfer Capacitance		--	31	40	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{ V}, I_D = 19\text{ A},$ $R_G = 25\ \Omega$ (Note 4, 5)	--	12	31	ns
t_r	Turn-On Rise Time		--	400	800	ns
$t_{d(off)}$	Turn-Off Delay Time		--	20	50	ns
t_f	Turn-Off Fall Time		--	120	250	ns
Q_g	Total Gate Charge		$V_{DS} = 80\text{ V}, I_D = 19\text{ A},$ $V_{GS} = 5\text{ V}$ (Note 4, 5)	--	12	14
Q_{gs}	Gate-Source Charge		--	2.5	--	nC
Q_{gd}	Gate-Drain Charge		--	9.0	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	15.6	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	62.4	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 15.6\text{ A}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 19\text{ A},$ $di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	80	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.195	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 1.35\text{mH}, I_{AS} = 15.6\text{A}, V_{DD} = 25\text{V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 19\text{A}, di/dt \leq 300\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Typical Characteristics

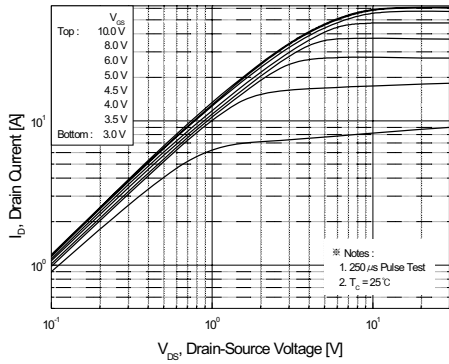


Figure 1. On-Region Characteristics

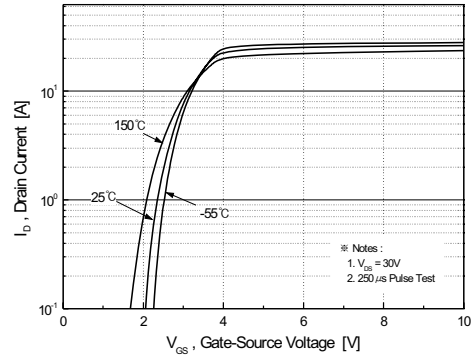


Figure 2. Transfer Characteristics

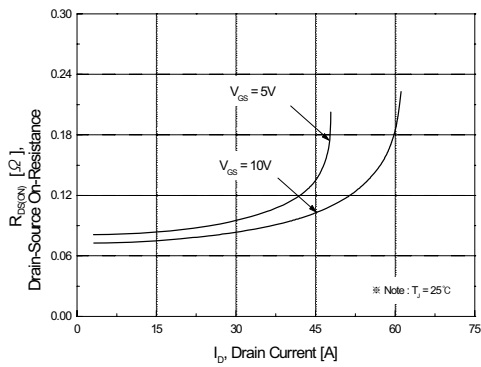


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

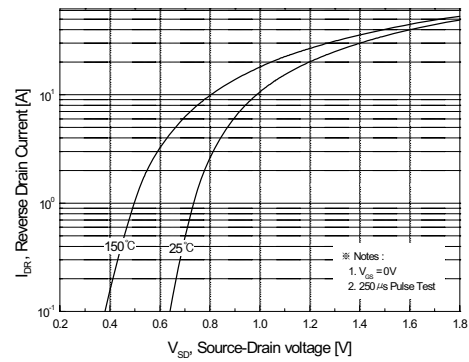


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

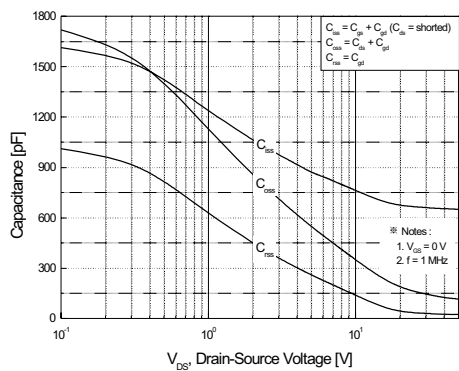


Figure 5. Capacitance Characteristics

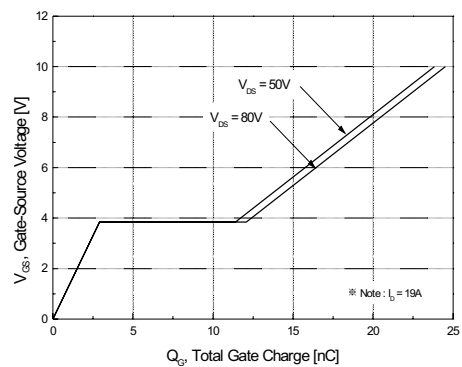


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

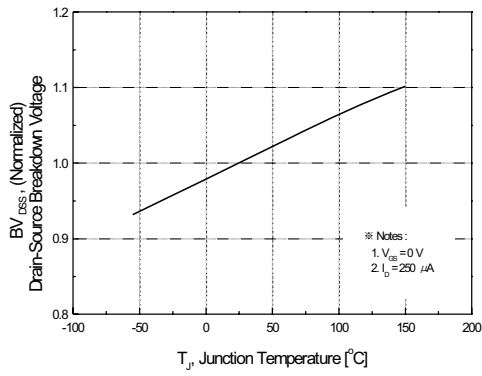


Figure 7. Breakdown Voltage Variation vs. Temperature

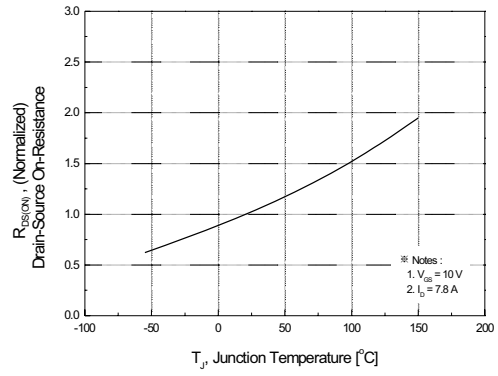


Figure 8. On-Resistance Variation vs. Temperature

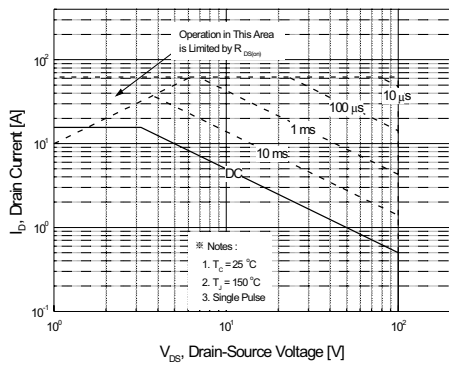


Figure 9. Maximum Safe Operating Area

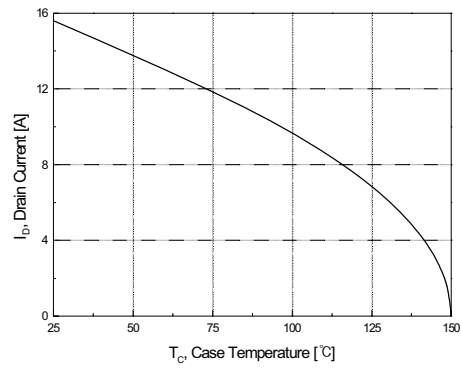


Figure 10. Maximum Drain Current vs. Case Temperature

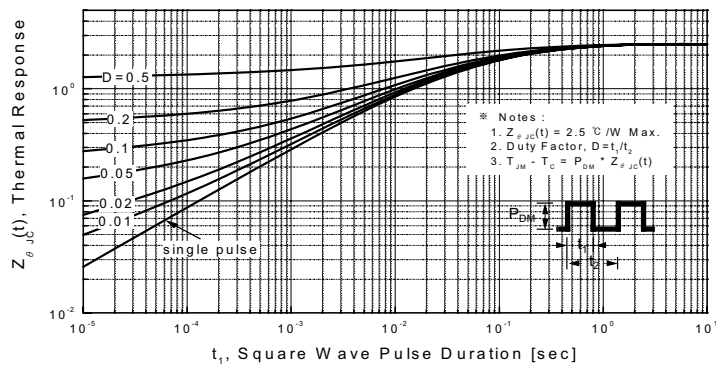
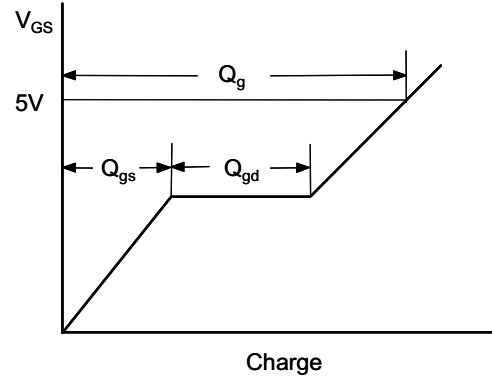
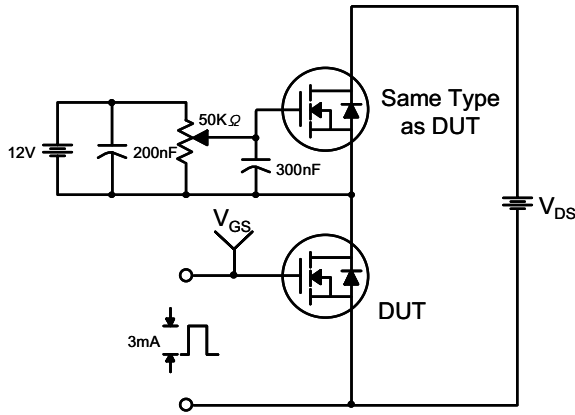
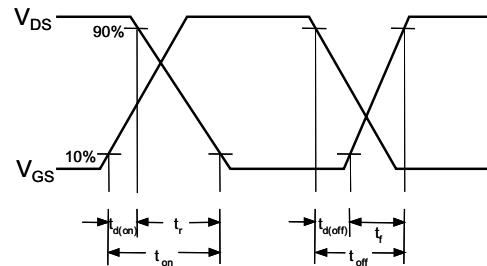
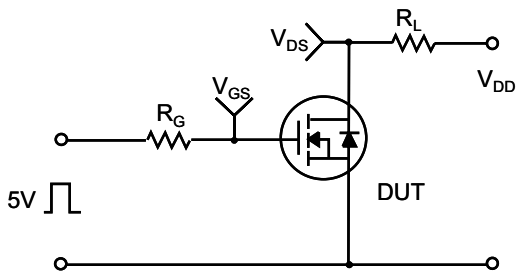


Figure 11. Transient Thermal Response Curve

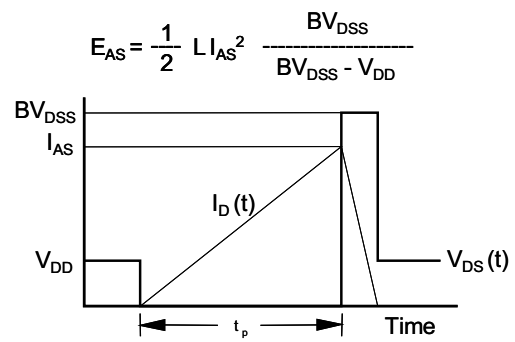
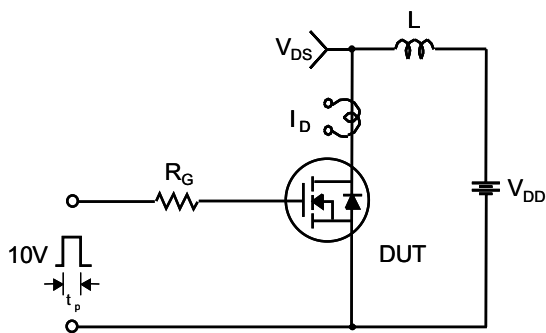
Gate Charge Test Circuit & Waveform



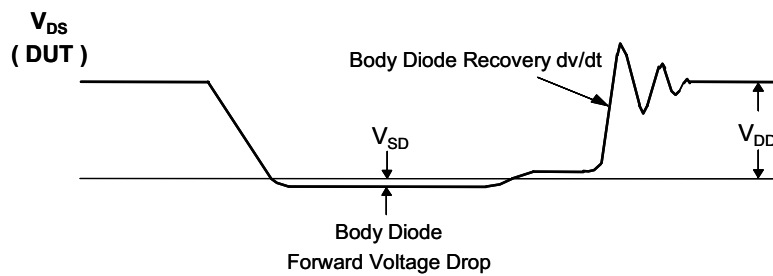
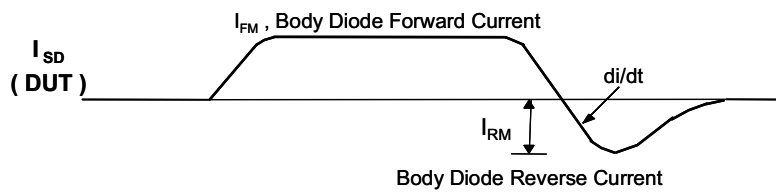
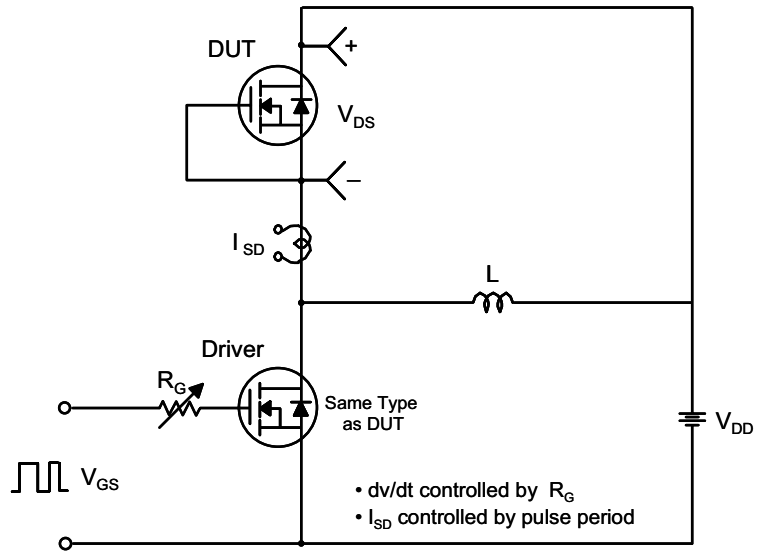
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



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