



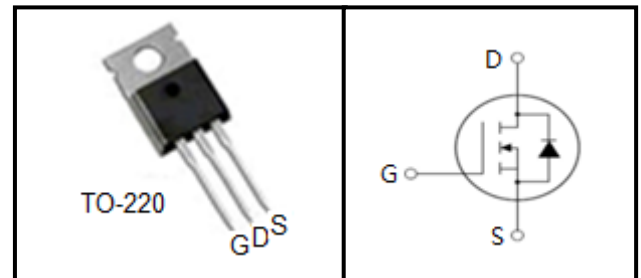
# 100V N-Channel Trench MOSFET

## FEATURES

- High Density Cell Design for Ultra Low R<sub>ds(on)</sub>
- Fully Characterized Avalanche Voltage and Current
- Good Stability with High E<sub>AS</sub>
- Excellent Package for Good Heat Dissipation

## APPLICATIONS

- Power Switching Application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply



Device Marking and Package Information		
Device	Package	Marking
TMP140N10A	TO-220	140N10A

Absolute Maximum Ratings T <sub>C</sub> = 25°C, unless otherwise noted			
Parameter	Symbol	Value	Unit
Drain-Source Voltage (V <sub>GS</sub> = 0V)	V <sub>DSS</sub>	100	V
Continuous Drain Current (Package Limited)	I <sub>D</sub>	130	A
Pulsed Drain Current (note1)	I <sub>DM</sub>	520	A
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Single Pulse Avalanche Energy (note2)	E <sub>AS</sub>	1300	mJ
Avalanche Current (note1)	I <sub>AS</sub>	70	A
Power Dissipation (T <sub>C</sub> = 25°C)	P <sub>D</sub>	235	W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55~+150	°C

Thermal Resistance			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R <sub>thJC</sub>	0.64	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>thJA</sub>	62.5	



Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	100	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	$\mu A$
		$V_{DS} = 100V, V_{GS} = 0V, T_J = 150^\circ\text{C}$	--	--	100	
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	--	4	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 30A$	--	6.0	7.0	m $\Omega$
Forward Transconductance (Note3)	$g_{fs}$	$V_{DS} = 5V, I_D = 20A$	50	--	--	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	6320	--	pF
Output Capacitance	$C_{oss}$		--	540	--	
Reverse Transfer Capacitance	$C_{rss}$		--	359	--	
Total Gate Charge	$Q_g$	$V_{DD} = 50V, I_D = 20A,$ $V_{GS} = 10V$	--	146	--	nC
Gate-Source Charge	$Q_{gs}$		--	27	--	
Gate-Drain Charge	$Q_{gd}$		--	54	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 50V, I_D = 2A,$ $R_G = 2.5\Omega$	--	31.5	--	ns
Turn-on Rise Time	$t_r$		--	33	--	
Turn-off Delay Time	$t_{d(off)}$		--	46	--	
Turn-off Fall Time	$t_f$		--	17.5	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	140	A
Pulsed Diode Forward Current	$I_{SM}$		--	--	560	
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = 20A, V_{GS} = 0V$	--	--	1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F = 20A,$ $di_F/dt = 500A/\mu s$	--	51	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	61	--	nC

**Notes**

1. Repetitive Rating: Pulse Width limited by maximum junction temperature
2.  $I_{AS} = 70A, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse Width  $\leq 300\mu s, \text{Duty Cycle } \leq 1\%$



Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 1. Output Characteristics

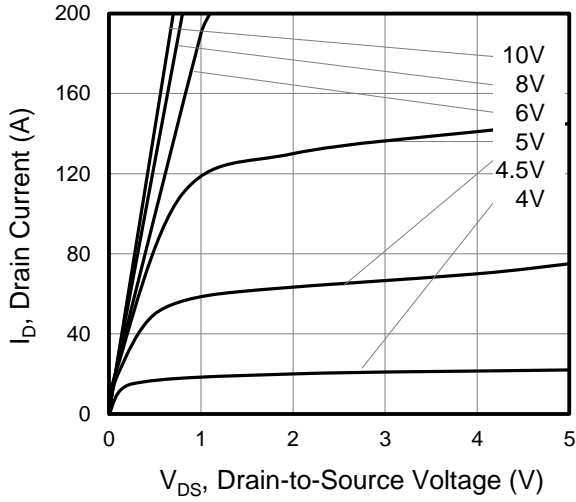


Figure 2. Transfer Characteristics

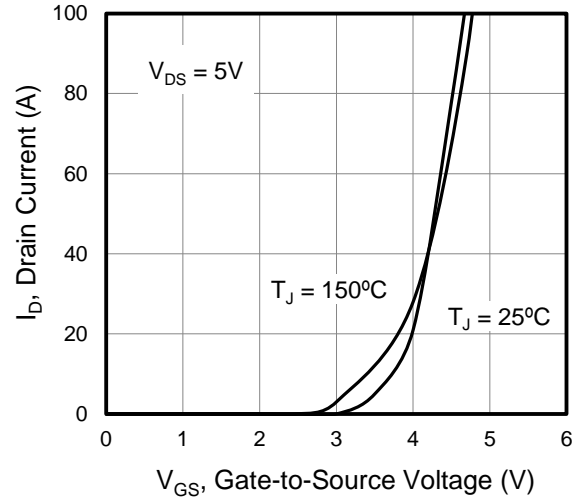


Figure 3. On-Resistance vs. Drain Current

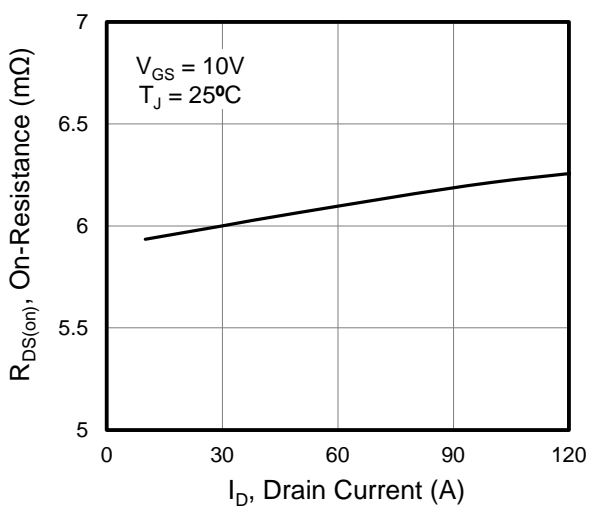


Figure 4. Capacitance

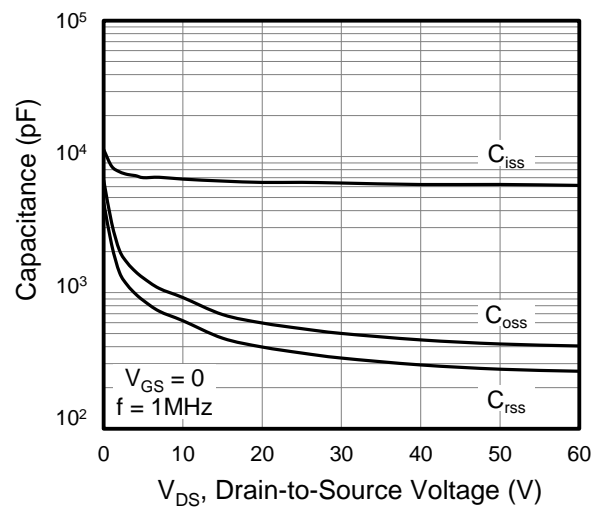


Figure 5. Gate Charge

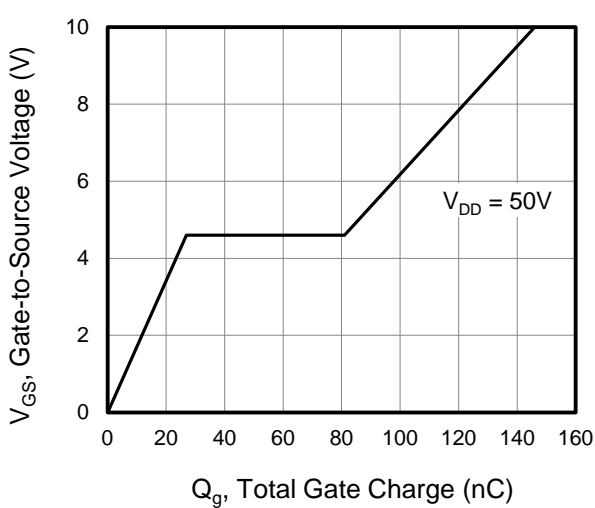
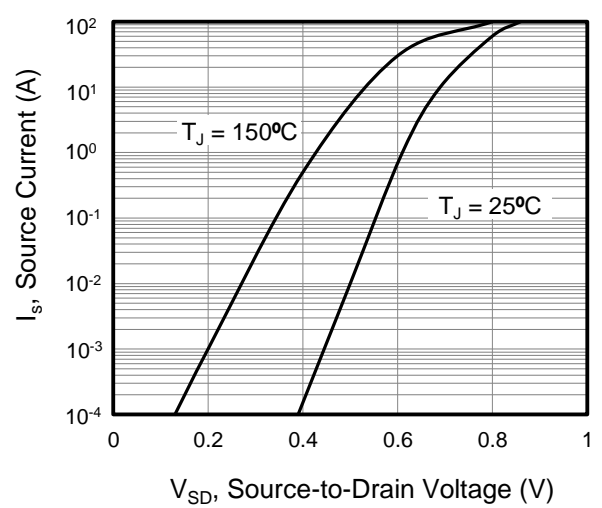


Figure 6. Body Diode Forward Voltage





Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 7. On-Resistance vs. Junction Temperature

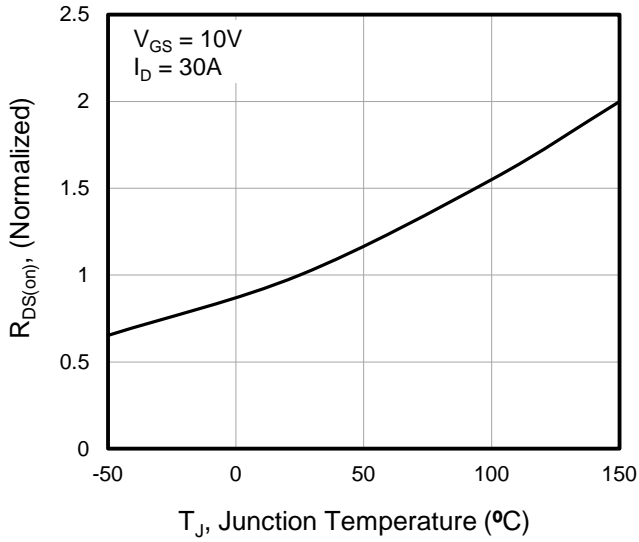


Figure 8. Threshold Voltage vs. Junction Temperature

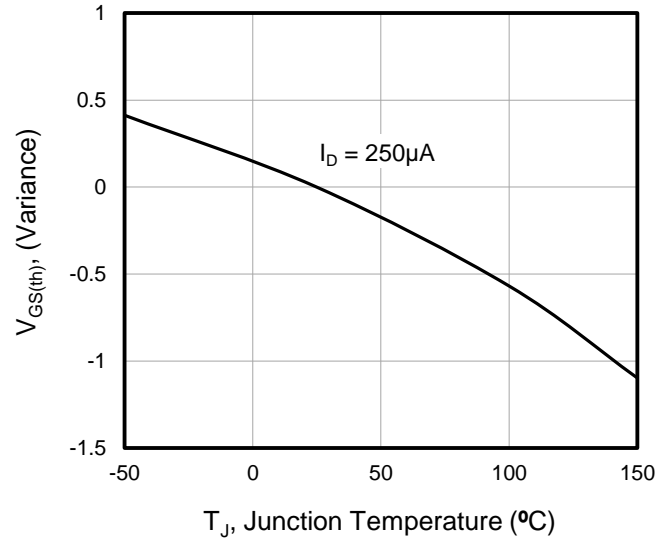


Figure 9. Transient Thermal Impedance

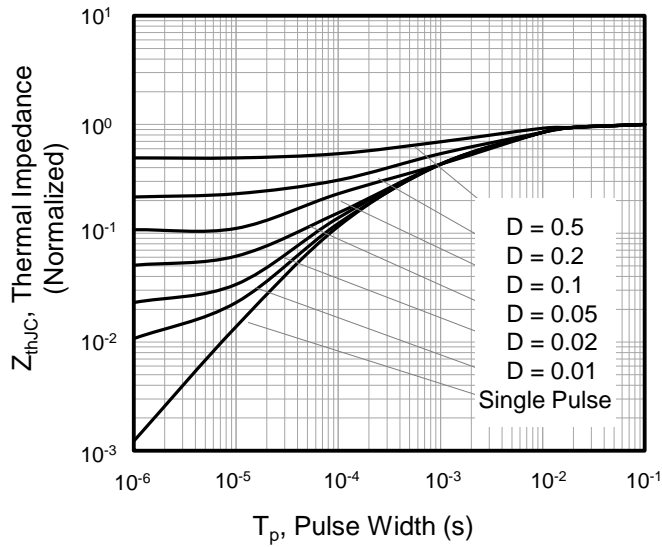




Figure A: Gate Charge Test Circuit and Waveform



Figure B: Resistive Switching Test Circuit and Waveform

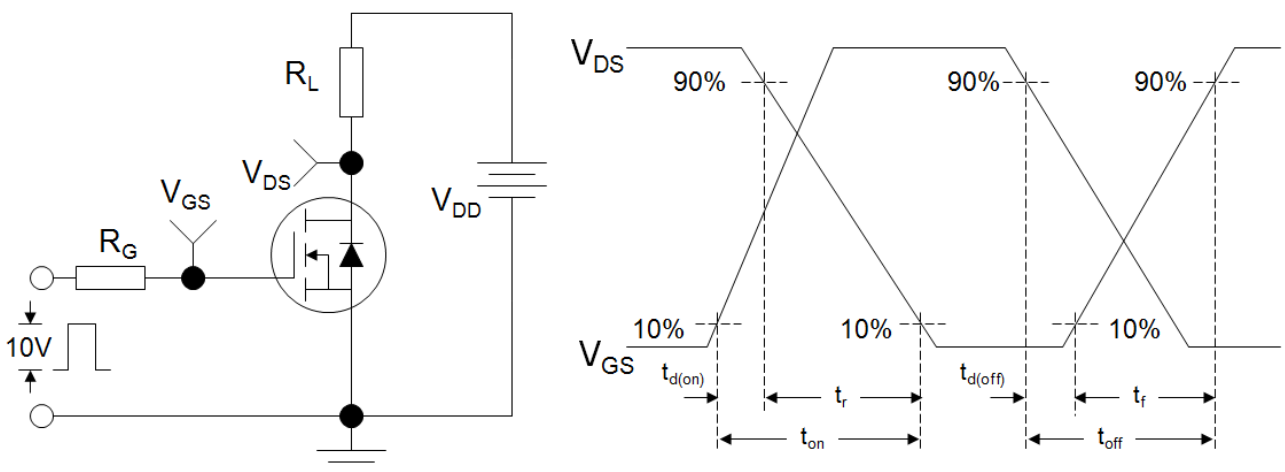
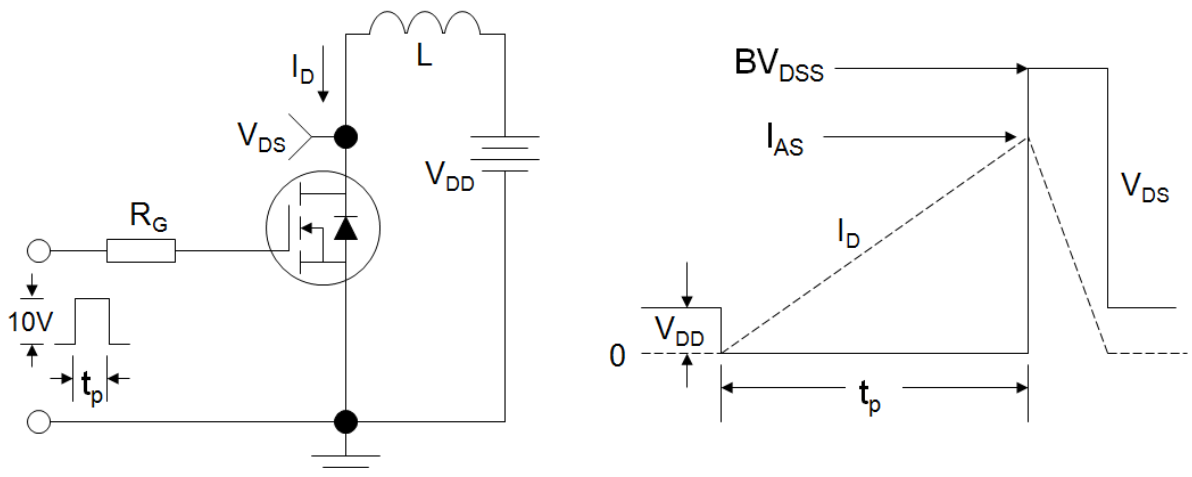
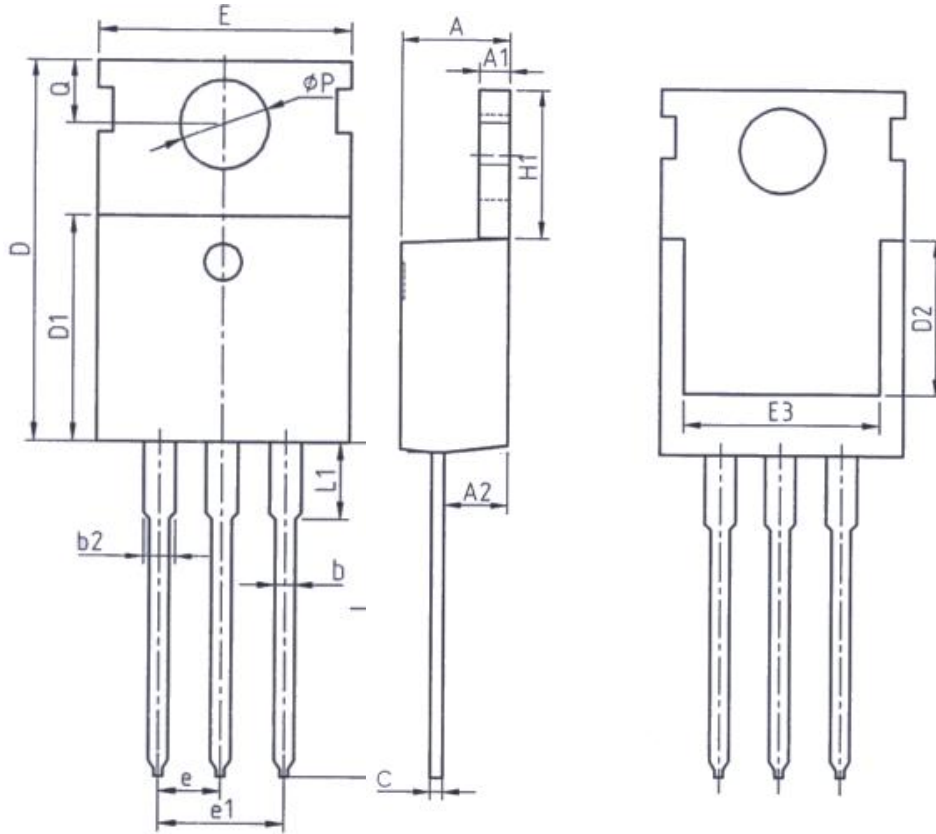


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





### TO-220



Unit: mm		
Symbol	Min.	Max.
A	4.37	4.77
A1	1.25	1.45
A2	2.20	2.60
b	0.70	0.95
b2	1.17	1.47
c	0.40	0.65
D	15.10	16.10
D1	8.80	9.40
D2	5.50	-

Unit: mm		
Symbol	Min.	Max.
E	9.70	10.30
E3	7.00	-
e	2.54BSC	
e1	5.08BSC	
H1	6.25	6.85
L	12.75	13.80
L1	-	3.40
P	3.40	3.80
Q	2.60	3.00



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