

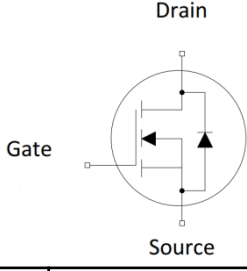


**100V N-Channel DTMOS**

<b>General Description</b> <ul style="list-style-type: none"> <li>● Trench Power SGT technology</li> <li>● Very low on-resistance <math>R_{DS(ON)}</math></li> <li>● Low Gate Charge</li> <li>● Excellent Gate Charge x <math>R_{DS(ON)}</math> Product</li> </ul> <b>Applications</b> <ul style="list-style-type: none"> <li>● High Frequency Switching and Synchronous Rectification</li> </ul>		<b>Product Summary</b> <table> <tr> <td><math>V_{DS}</math></td> <td>100V</td> </tr> <tr> <td>ID (at VGS=10V)</td> <td>150A</td> </tr> <tr> <td>RDS(ON) (at VGS=10V)</td> <td>&lt; 4.2mΩ</td> </tr> </table> <p>100% UIS Tested</p> 		$V_{DS}$	100V	ID (at VGS=10V)	150A	RDS(ON) (at VGS=10V)	< 4.2mΩ
$V_{DS}$	100V								
ID (at VGS=10V)	150A								
RDS(ON) (at VGS=10V)	< 4.2mΩ								
<b>TO-220</b> 									
<b>Device</b>	<b>Package</b>	<b>Form</b>	<b>Marking</b>						
TSP15N10A	TO-220	Tube	P15N10A						

<b>Absolute Maximum Ratings (<math>T_A = 25^\circ\text{C}</math> unless otherwise noted)</b>			
Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ\text{C}$	150
		$T_C = 100^\circ\text{C}$	90
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	600	A
Avalanche Current <sup>A</sup>	$I_{AS}$	28	A
Single Pulse Avalanche Energy $L = 0.3\text{mH}$ <sup>A</sup>	$E_{AS}$	609	mJ
Power Dissipation <sup>C</sup>	$P_D$	$T_C = 25^\circ\text{C}$	208
		$T_C = 100^\circ\text{C}$	125
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$

<b>Thermal Resistance</b>			
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Case	$R_{thJC}$	0.6	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient			



Electrical Characteristics( $T_J = 25^\circ\text{C}$ unless otherwise noted)							
Symbol	Parameter	Conditions	Value			Units	
			Min	Typ	Max		
<b>STATIC PARAMETERS</b>							
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	100	--	--	V	
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 100\text{V}, V_{GS} = 0\text{V}$	$T_J = 25^\circ\text{C}$	--	--	1	$\mu\text{A}$
			$T_J = 100^\circ\text{C}$	--	--	100	
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	--		$\pm 100$	nA	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2	3	4	V	
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{V}, I_D = 50\text{A}$	--	3.5	4.2	$\text{m}\Omega$	
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 50\text{A}$	--	140	--	S	
$V_{SD}$	Diode Forward Voltage	$I_S = 50\text{A}, V_{GS} = 0\text{V}$	--	--	1	V	
$I_S$	Maximum Body-Diode Continuous Current <sup>B</sup>		--	--	50	A	
<b>DYNAMIC PARAMETERS</b>							
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 50\text{V}, f = 1\text{MHz}$	--	7700	--	$\text{pF}$	
$C_{oss}$	Output Capacitance		--	470	--		
$C_{rss}$	Reverse Transfer Capacitance		--	28	--		
<b>SWITCHING PARAMETERS</b>							
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS} = 10\text{V}, V_{DS} = 50\text{V}, I_D = 50\text{A}$	--	138	--	nC	
$Q_{gs}$	Gate Source Charge		--	37	--		
$Q_{gd}$	Gate Drain Charge		--	35.5	--		
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{V}, V_{DS} = 50\text{V}, I_D = 50\text{A}, R_G = 3\Omega$	--	35	--	ns	
$t_r$	Turn-On Rise Time		--	22	--		
$T_{D(off)}$	Turn-Off Delay Time		--	105	--		
$t_f$	Turn-Off Fall Time		--	45	--		
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = 50\text{A}, di/dt = 500\text{A}/\mu\text{s}$	--	50	--	ns	
$Q_{rr}$	Body Diode Reverse Recovery Charge		--	110	--	nC	

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation  $P_D$  is based on  $T_{J(MAX)} = 175^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.



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

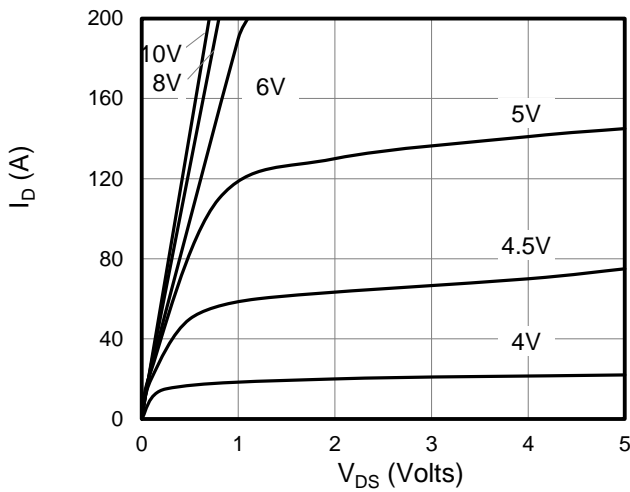


Figure 1: On-Region Characteristics

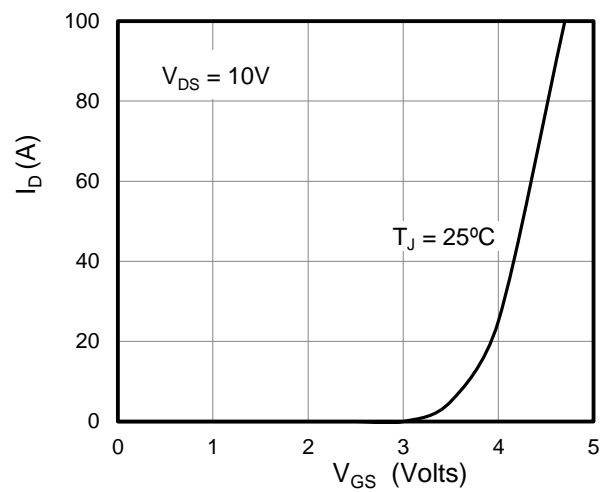


Figure 2: Transfer Characteristics

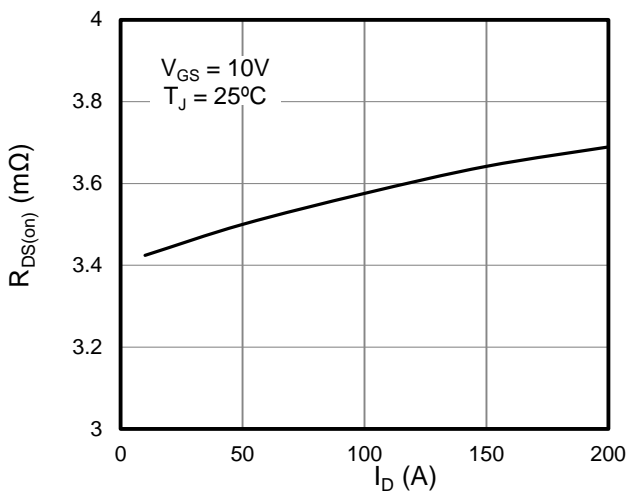


Figure 3: On-Resistance vs. Drain Current

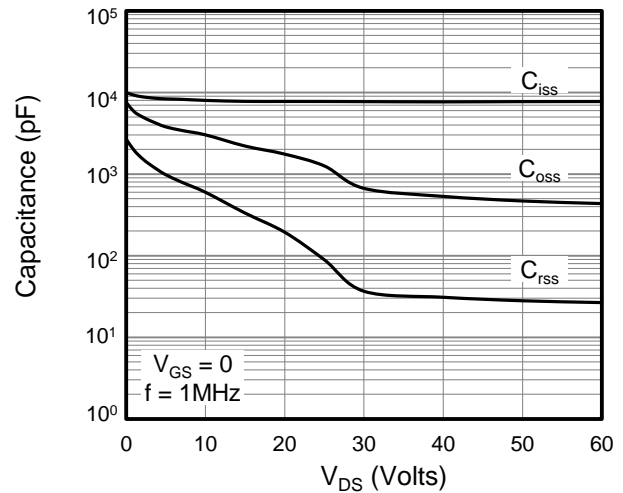


Figure 4: Capacitance Characteristics

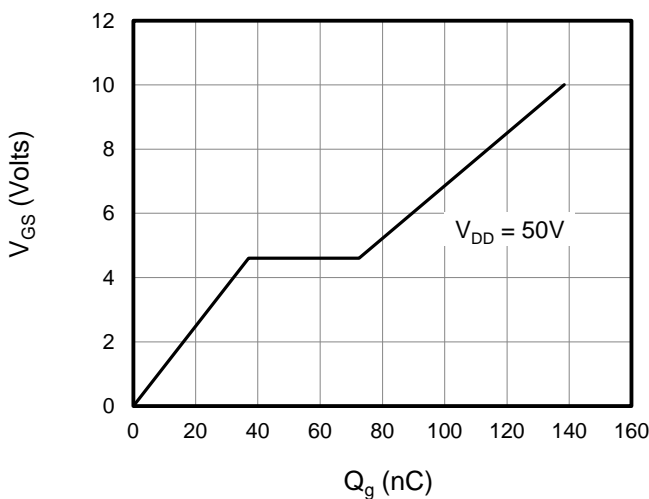


Figure 5: Gate Charge Characteristics

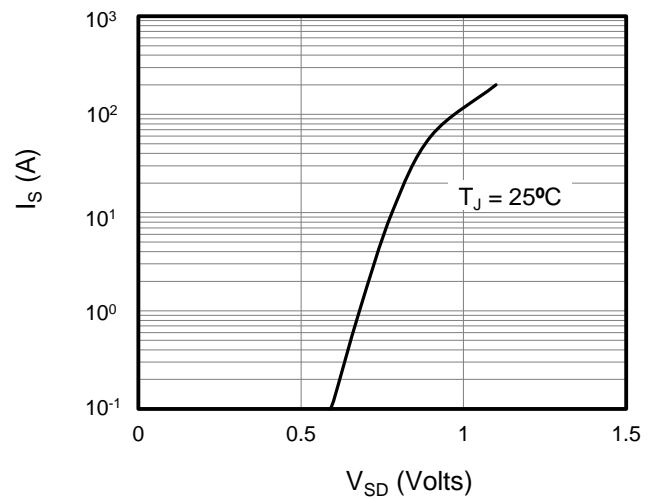


Figure 6: Body Diode Forward Voltage



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

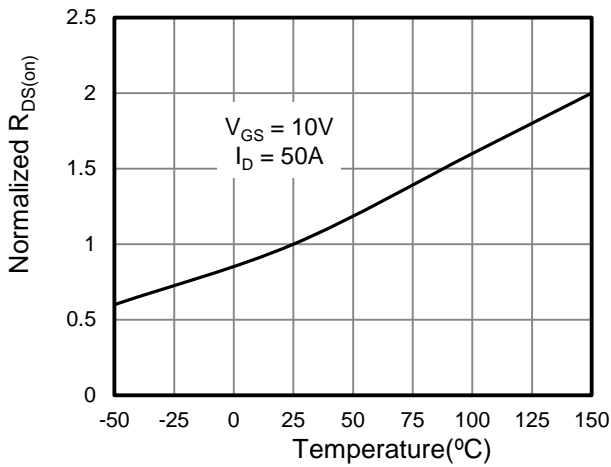


Figure 7: On-Resistance vs. Junction Temperature

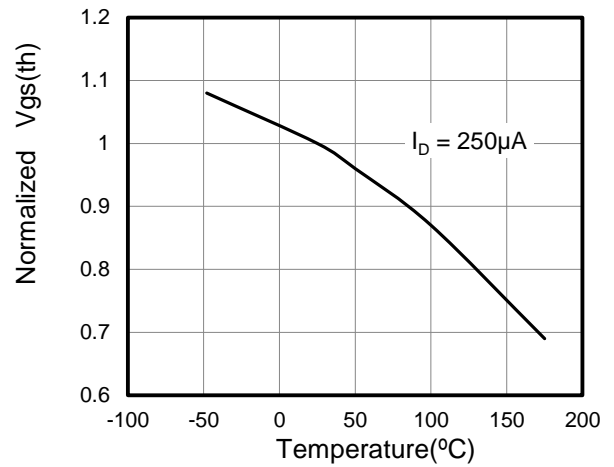


Figure 8:  $V_{GS(th)}$  vs. Junction Temperature

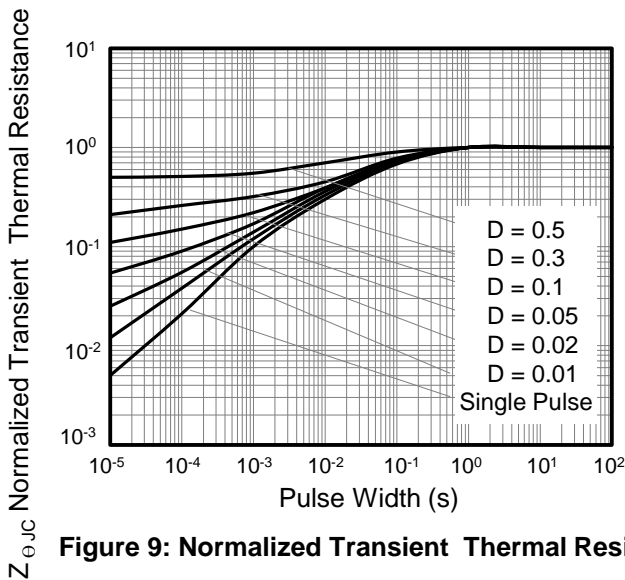


Figure 9: Normalized Transient Thermal Resistance

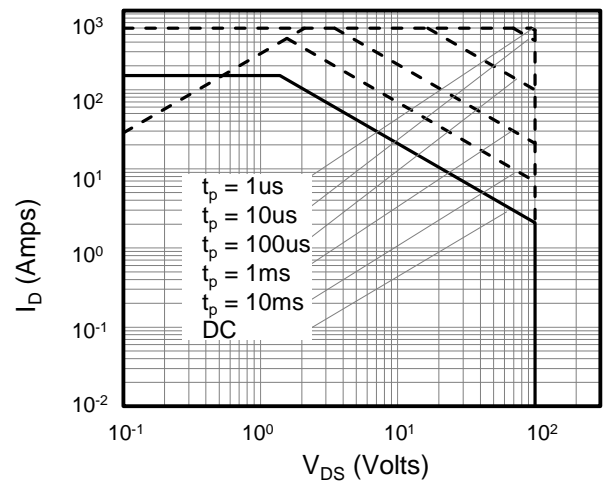


Figure 10: Safe Operating Area



Figure A: Gate Charge Test Circuit and Waveform



Figure B: Resistive Switching Test Circuit and Waveform

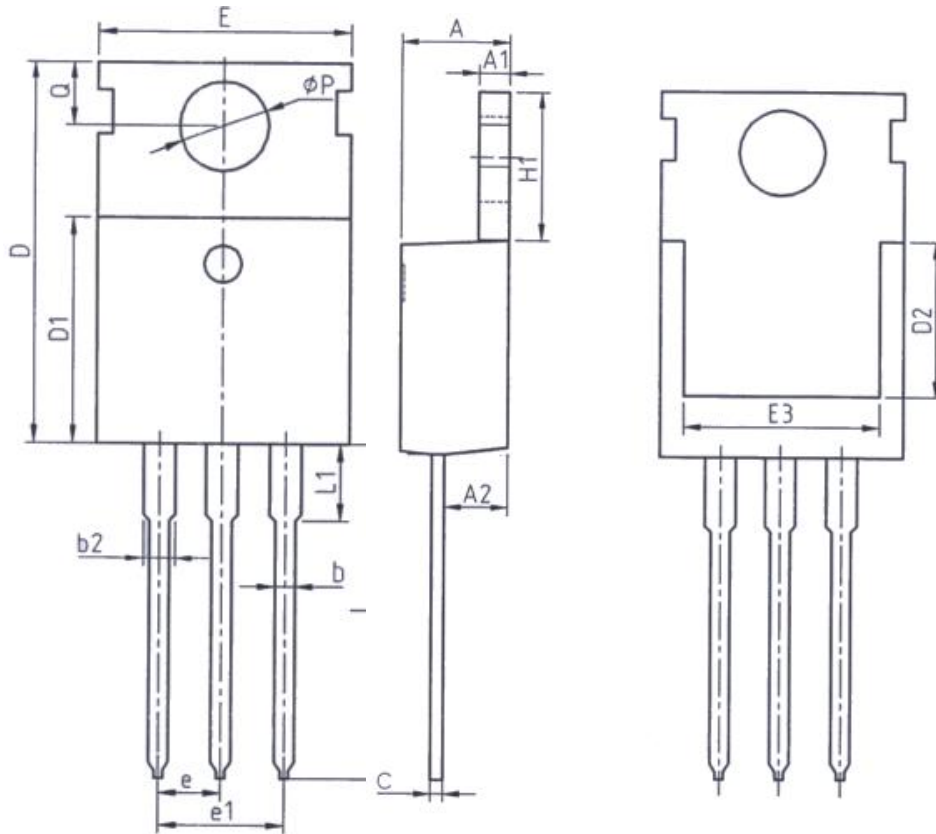


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





### 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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