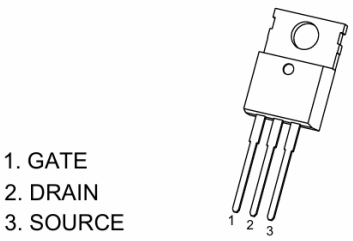
GPT087N20NTB

200V N-Channel MOSFET

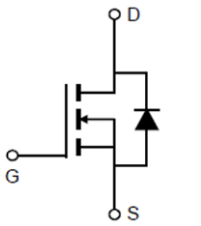
Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
200V	8.7mΩ@10V	135A

TO-220-3L-C



Schematic diagram



Feature

- Split Gate Trench Technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance
- 100% UIS Tested

Application

- Synchronous Rectification in SMPS
- Hard Switching and High Speed Circuit
- Power Tools
- UPS
- Motor Control

Package Marking and Ordering Information

Part Number	Package	Marking	Packing	Reel Size	Tape Width	Qty
GPT087N20NTB	TO-220-3L-C	T087N20N	Tube	-	-	50pcs

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	200	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current[1]	T_C = 25°C	I_D	135	A
	T_C = 100°C		85	
Pulsed Drain Current[2]		I_{DM}	540	A
Single Pulsed Avalanche Current[3]		I_{AS}	60	A
Single Pulsed Avalanche Energy[3]		E_{AS}	900	mJ
Power Dissipation[5]	T_C = 25°C	P_D	250	W
Thermal Resistance from Junction to Ambient[6]		$R_{\theta JA}$	69	°C/W
Thermal Resistance from Junction to Case		$R_{\theta JC}$	0.5	°C/W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~ +150	°C

MOSFET ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	200			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 200V, V_{GS} = 0V			1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
On Characteristics[4]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2	3	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 20A		8.7	10.4	mΩ
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} = 100V, V_{GS} = 0V, f = 0.1MHz		5707		pF
Output Capacitance	C_{oss}			439		
Reverse Transfer Capacitance	C_{rss}			18		
Gate Resistance	R_g	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz		5.2		Ω
Switching Characteristics						
Total Gate Charge	Q_g	V_{DS} = 100V, V_{GS} = 10V, I_D = 20A		75		nC
Gate-Source Charge	Q_{gs}			24		
Gate-Drain Charge	Q_{gd}			11		
Gate Plateau Voltage	$V_{plateau}$			4.4		V
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 100V, V_{GS} = 10V, R_G = 3Ω, I_D = 20A		20		ns
Turn-On Rise Time	t_r			31		
Turn-Off Delay Time	$t_{d(off)}$			42		
Turn-Off Fall Time	t_f			21		
Source-Drain Diode Characteristics						
Diode Forward Voltage[4]	V_{SD}	V_{GS} = 0V, I_S = 20A			1.2	V
Diode Continuous Forward Current[1]	I_S	T_C = 25°C			135	A
Diode Reverse Recovery Time	t_{rr}	I_F = 20A, dI/dt = 100A/μs		129		ns
Diode Reverse Recovery Charge	Q_{rr}			500		nC

Notes:

1.The maximum current rating is limited by package. And device mounted on a large heatsink.

2.Pulse Test: Pulse Width ≤ 10μs, duty cycle ≤ 1%.

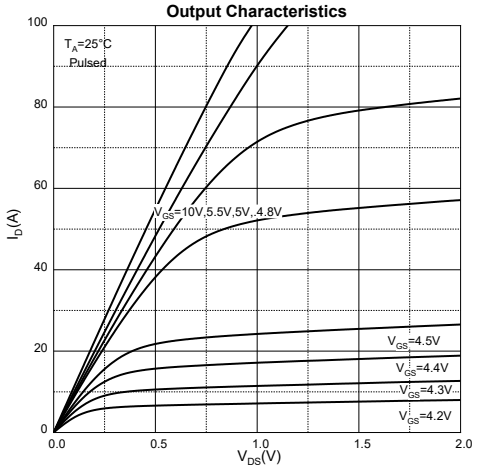
3.E_{AS} condition: V_{DD} = 100V, V_{GS} = 10V, L = 0.5mH, R_G = 25Ω Starting T_J = 25°C.

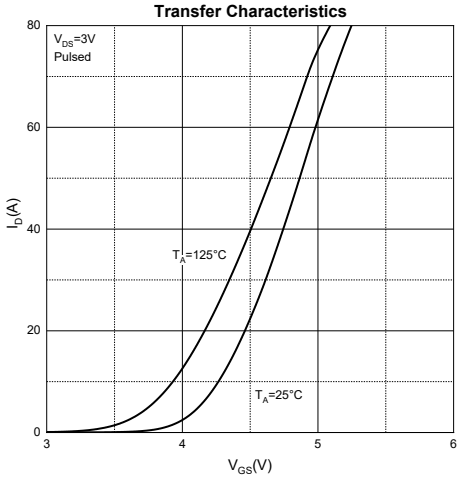
4.Pulse Test: Pulse Width ≤ 300μs, duty cycle ≤ 2%.

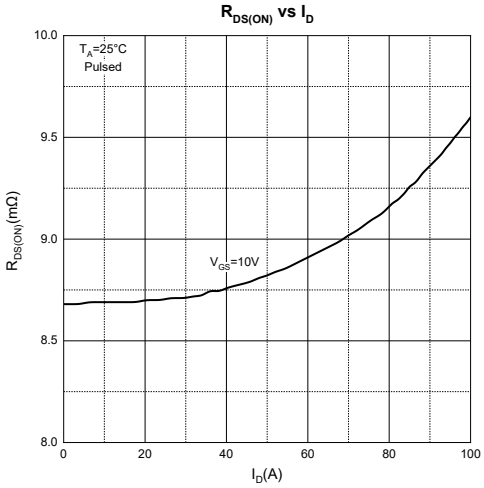
5.The power dissipation P_D is limited by $T_{J(MAX)}$ = 150°C. And device mounted on a large heatsink.

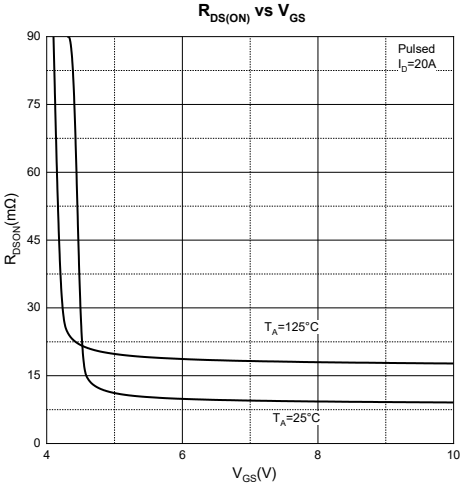
6.Device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C.

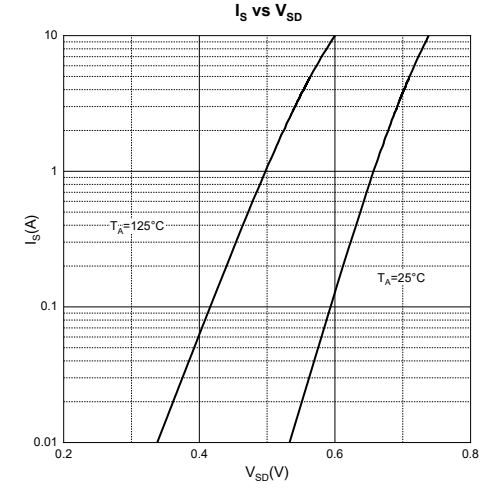
Typical Characteristics

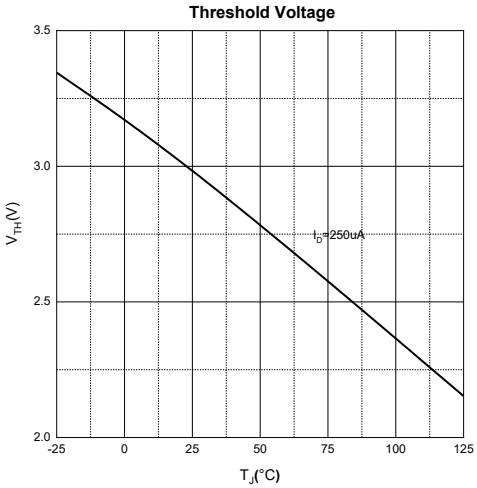


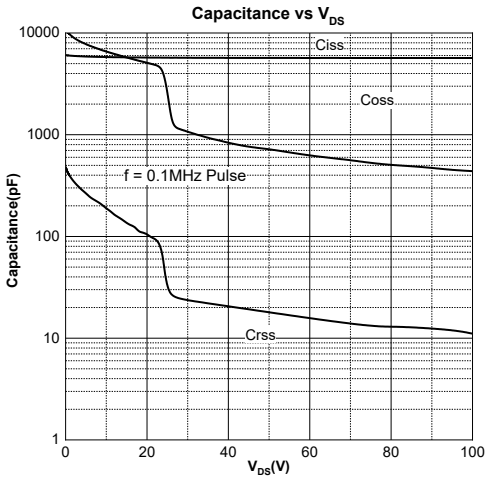


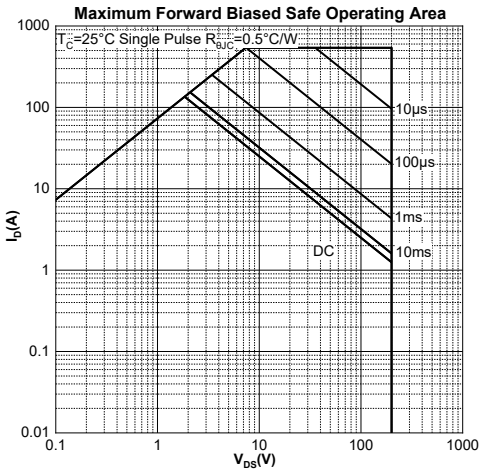


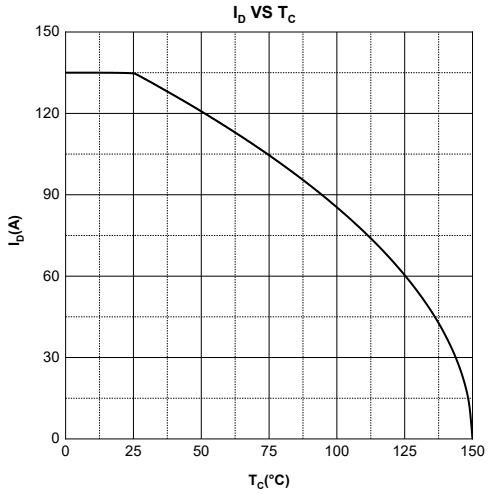


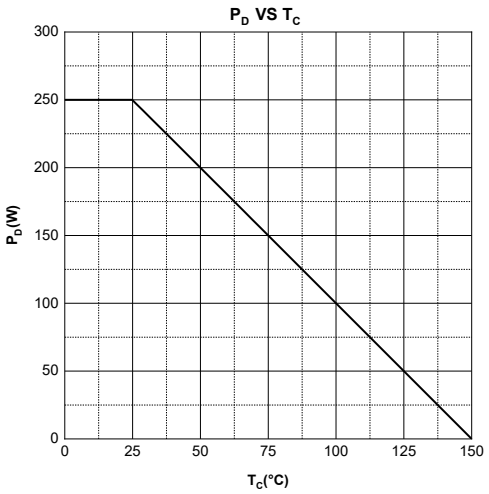


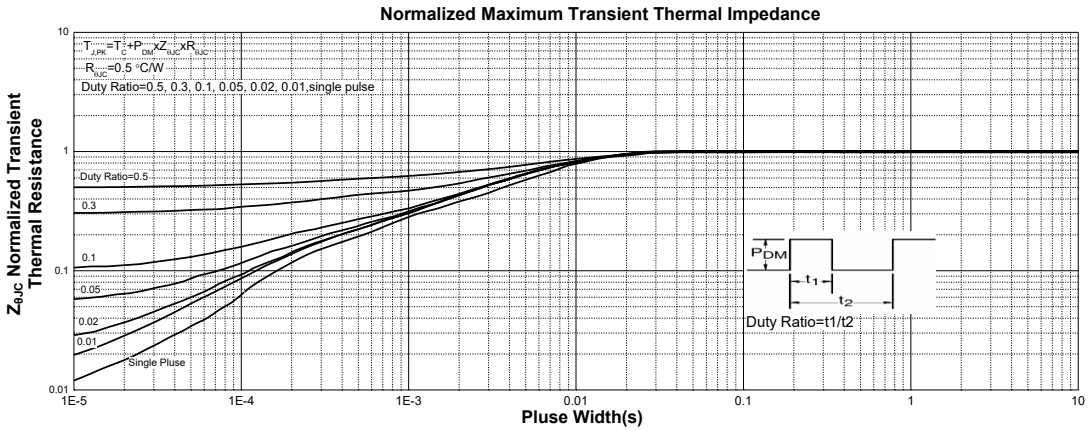



Capacitance vs V_{DS}
Ciss
Coss
f = 0.1MHz Pulse
Crss
Capacitance(pF)
V_{DS}(V)


Maximum Forward Biased Safe Operating Area
T_C=25°C Single Pulse $R_{\theta JC}$=0.5°C/W
10μs
100μs
1ms
10ms
DC
I_D(A)
V_{DS}(V)

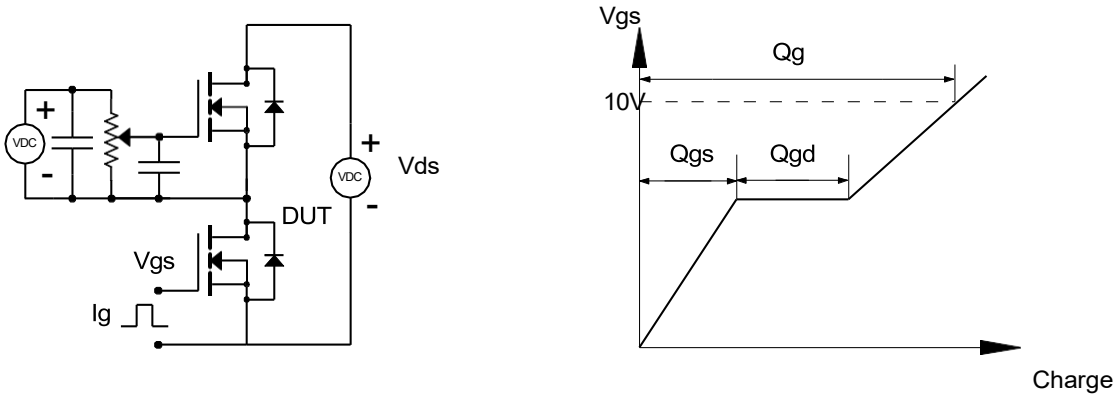

I_D VS T_C
I_D(A)
T_C(°C)


P_D VS T_C
P_D(W)
T_C(°C)

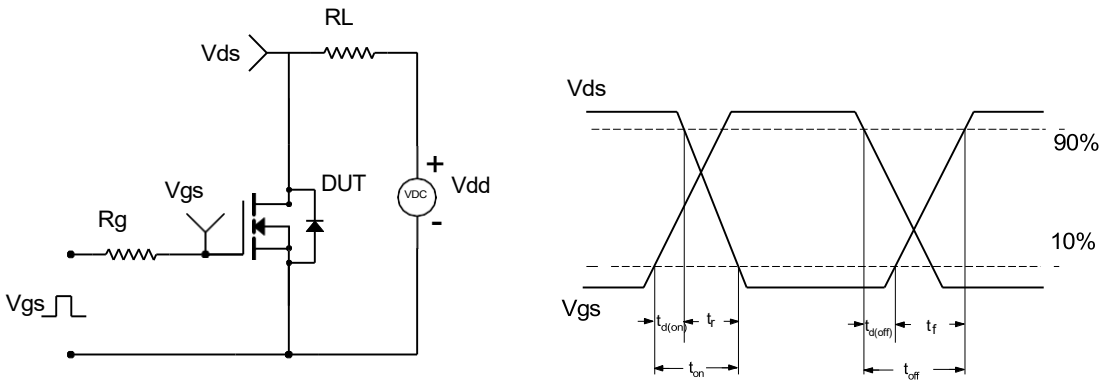

Normalized Maximum Transient Thermal Impedance
$T_{J,PK}=T_C+P_{DM}xZ_{\theta JC}xR_{\theta JC}$
$R_{\theta JC}$=0.5 °C/W
Duty Ratio=0.5, 0.3, 0.1, 0.05, 0.02, 0.01,single pulse
Duty Ratio=0.5
0.3
0.1
0.05
0.02
0.01
Single Pluse
P_{DM}
t_1
t_2
Duty Ratio=t1/t2
$Z_{\theta JC}$ Normalized Transient Thermal Resistance
Pluse Width(s)

Test Circuit

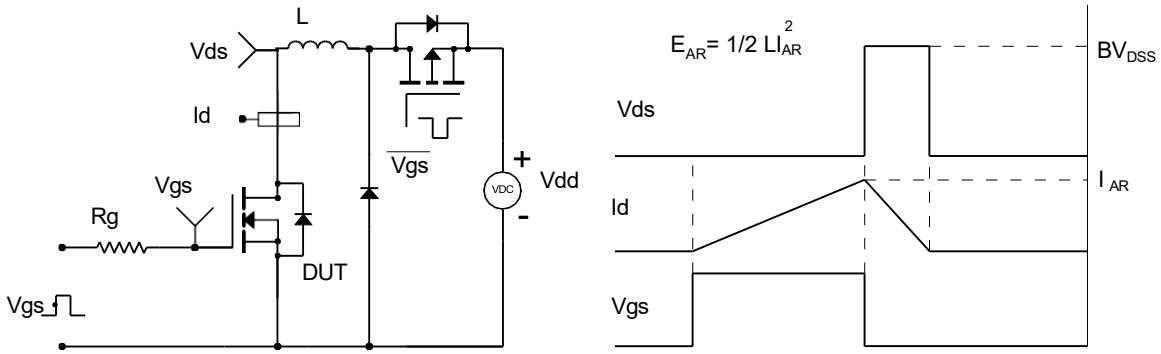
Gate Charge Test Circuit & Waveform



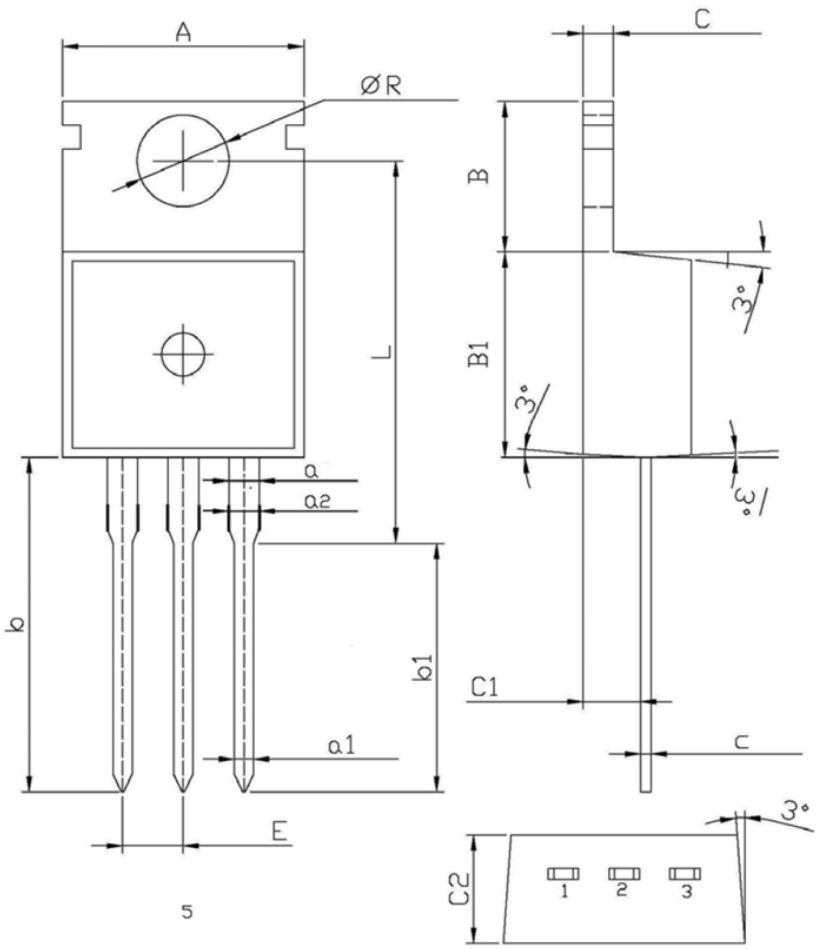
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



TO-220-3L-C Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	9.800	10.200	0.386	0.402
R	3.560	3.640	0.140	0.143
L	15.700	16.100	0.618	0.634
b	12.600	13.600	0.496	0.535
b1	9.600	10.600	0.378	0.417
a	1.220	1.320	0.048	0.052
E	2.340	2.740	0.092	0.108
a2	1.250	1.620	0.049	0.064
C	1.200	1.400	0.047	0.055
B	5.900	6.700	0.232	0.264
B1	9.000	9.400	0.354	0.370
C1	2.200	2.600	0.087	0.102
a1	0.700	0.900	0.028	0.035
c	0.400	0.600	0.016	0.024
C2	4.300	4.700	0.169	0.185

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