

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

### Product Summary



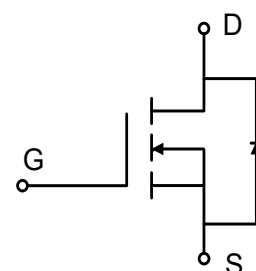
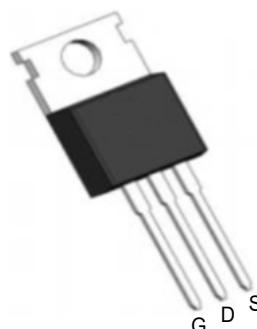
BVDSS	RDSON	ID
200V	23 mΩ	90A

### Description

The XRT90N20T is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XRT90N20T meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### TO220AB Pin Configuration



### Absolute Maximum Ratings (Tc= 25°C unless otherwise specified) :

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V <sub>DSS</sub>	Drain-Source Voltage		200	V
V <sub>GSS</sub>	Gate-Source Voltage		±20	V
T <sub>J</sub>	Maximum Junction Temperature		175	°C
T <sub>STG</sub>	Storage Temperature Range		-55 to 175	°C
I <sub>S</sub>	Source Current-Continuous(Body Diode)	Tc=25°C	90	A
Mounted on Large Heat Sink				
I <sub>DM</sub>	Pulsed Drain Current *	Tc=25°C	360	A
I <sub>D</sub>	Continuous Drain Current	Tc=25°C	90	A
		Tc=100°C	64	A
P <sub>D</sub>	Maximum Power Dissipation	Tc=25°C	375	W
		Tc=100°C	187.5	W
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case		0.4	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient **		40	°C/W
E <sub>AS</sub>	Single Pulsed-Avalanche Energy ***	L=0.5mH	833	mJ

**Electrical Characteristics** (T<sub>c</sub> = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions					Unit
				Min	Typ.	Max	
Static Characteristics							
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA		200	-		V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	V <sub>DS</sub> =200V, V <sub>GS</sub> =0V		-	-	1	μA
			T <sub>J</sub> =55°C	-	-	5	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA		2.0	3.0	4.0	V
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =± 20V, V <sub>DS</sub> =0V		-	-	±100	nA
R <sub>DS(ON)*</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =45A			23	25	mΩ
Diode Characteristics							
V <sub>SD</sub> *	Diode Forward Voltage	I <sub>SD</sub> =45A, V <sub>GS</sub> =0V		-	0.85	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =45A, dI <sub>SD</sub> /dt=100A/μs		-	80	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge			-	160	-	nC

**Electrical Characteristics (Cont.)** (T<sub>c</sub> = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HY1920			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V,V <sub>DS</sub> =0V, F=1MHz	-	3.4	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V,	-	5871	-	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =25V,	-	392	-	
C <sub>rss</sub>	Reverse Transfer Capacitance	Frequency=1.0MHz	-	165	-	
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DD</sub> =100V,R <sub>G</sub> =4Ω, I <sub>DS</sub> =45A,V <sub>GS</sub> =10V	-	29	-	ns
T <sub>r</sub>	Turn-on Rise Time		-	45	-	
t <sub>d(OFF)</sub>	Turn-off Delay Time		-	22	-	
T <sub>f</sub>	Turn-off Fall Time		-	41	-	
Gate Charge Characteristics						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	130	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	22	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	38	-	

a<sup>1</sup>: Repetitive rating; pulse width limited by maximum junction temperature

### Typical Operating Characteristic

Figure 1: Power Dissipation

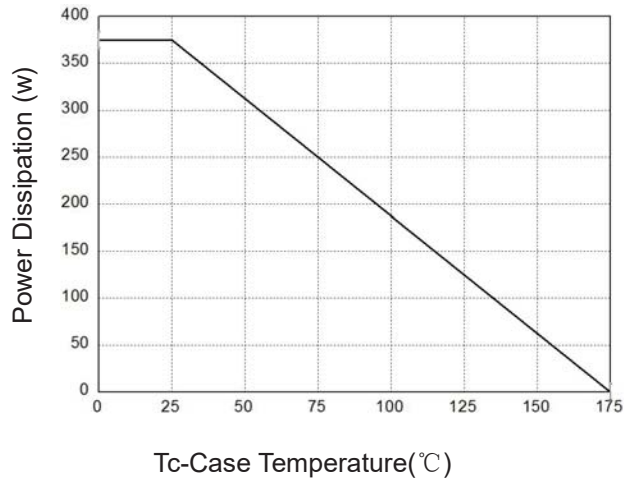


Figure 2: Drain Current

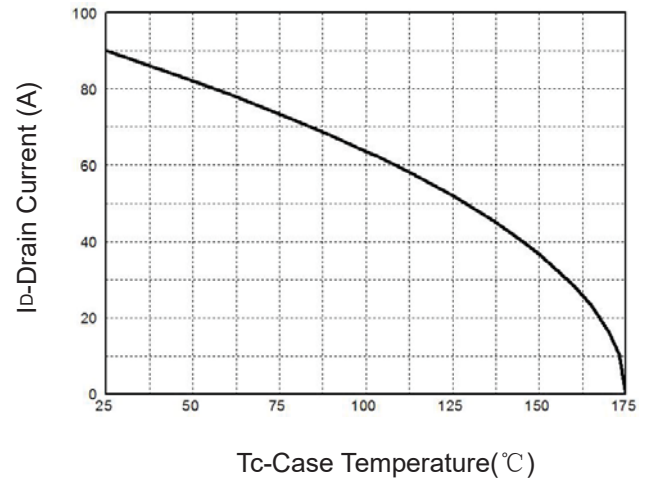


Figure 3: Safe Operation Area

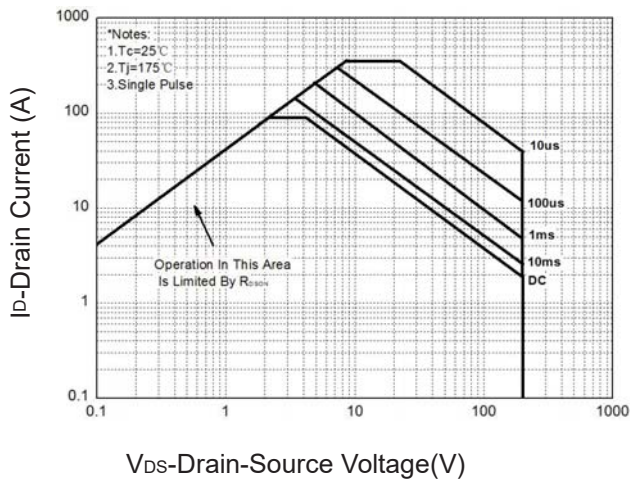
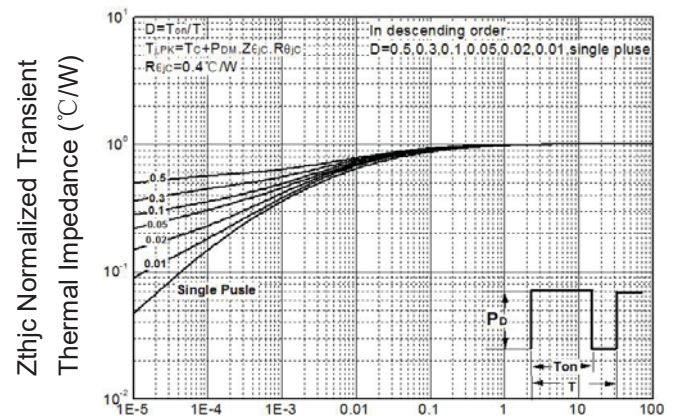


Figure 4: Thermal Transient Impedance



Maximum Effective Transient Thermal Impedance, Junction-to-Case

Figure 5: Output Characteristics

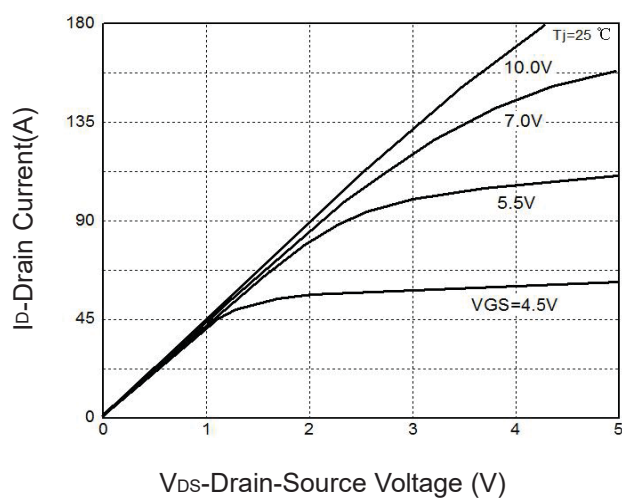
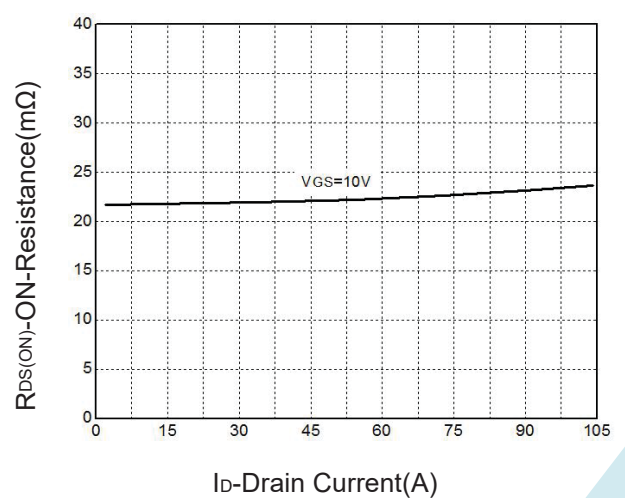


Figure 6: Drain-Source On Resistance



#### Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

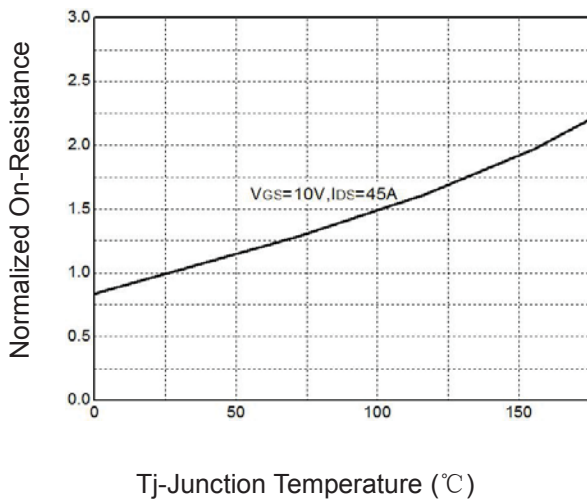


Figure 8: Source-Drain Diode Forward

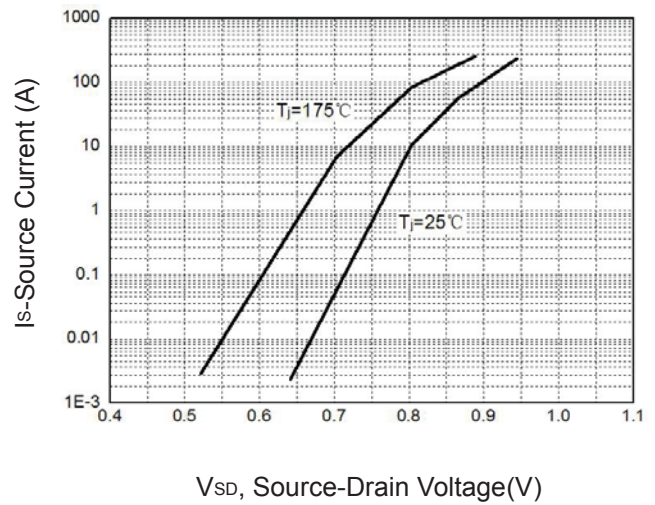


Figure 9: Capacitance Characteristics

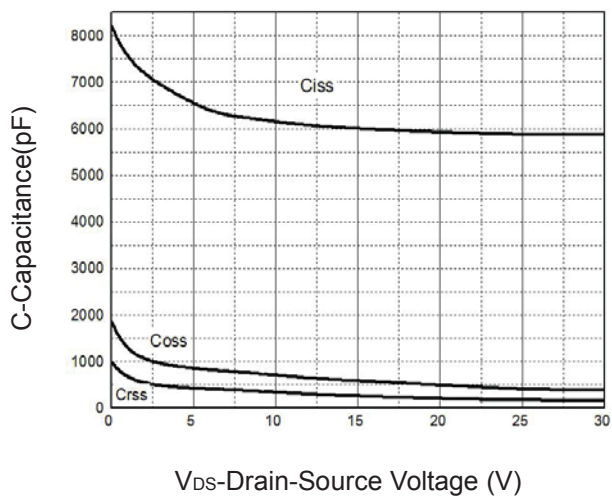
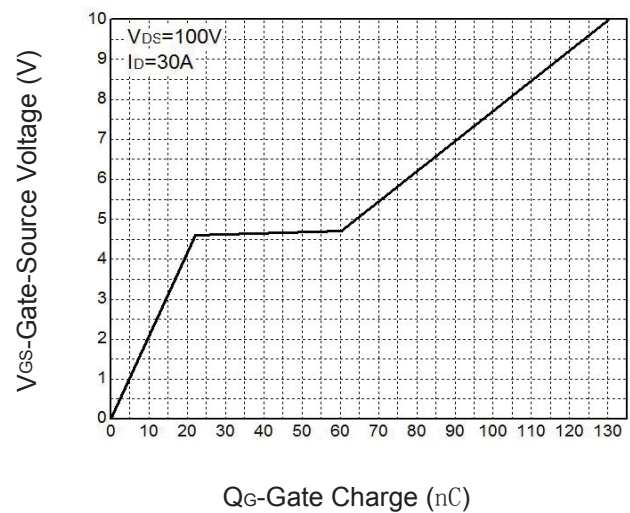
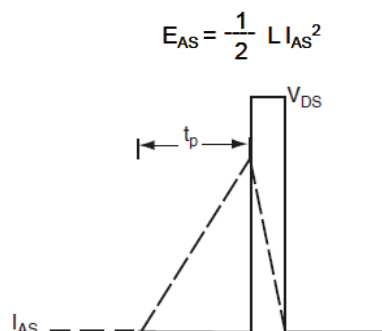
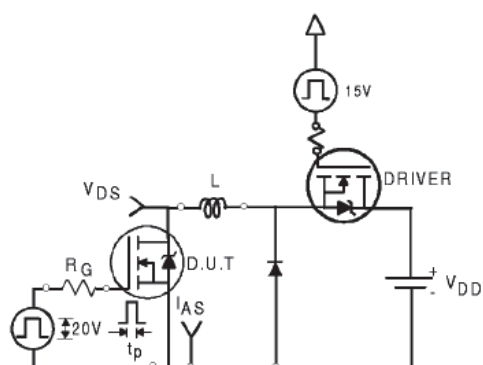


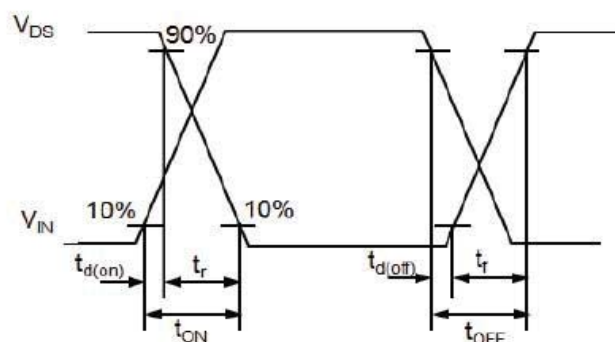
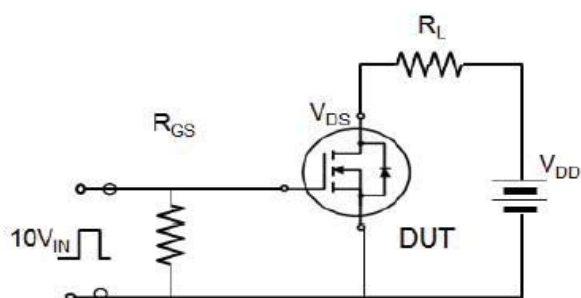
Figure 10: Gate Charge Characteristics



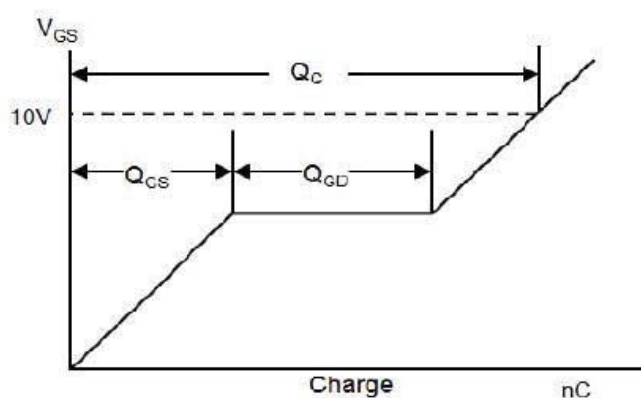
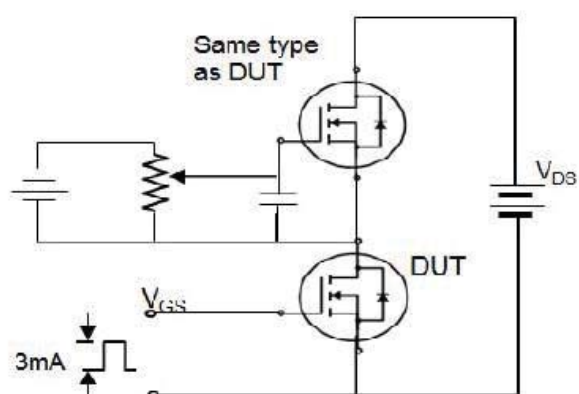
### Avalanche Test Circuit



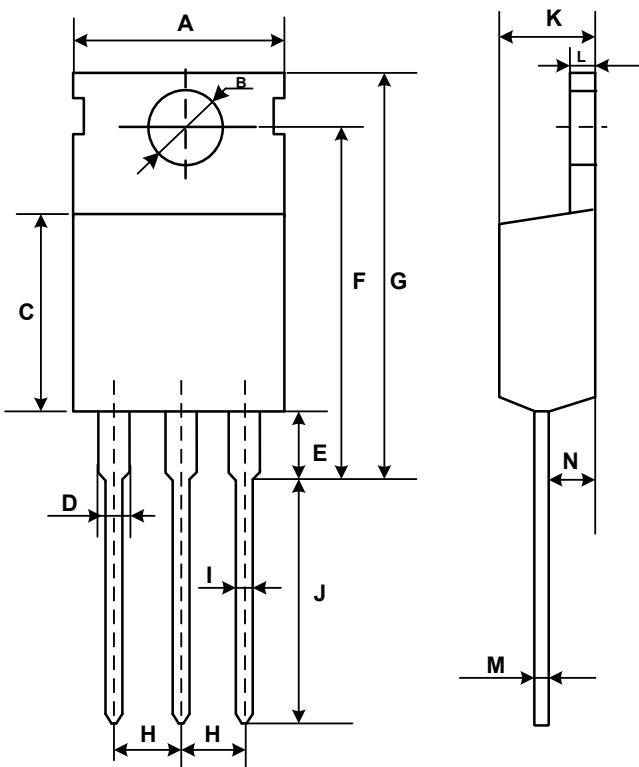
### Switching Time Test Circuit



### Gate Charge Test Circuit



Mechanical Dimensions for TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.70	10.30
B	3.40	3.80
C	8.80	9.40
D	1.17	1.47
E	2.60	3.50
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60