

Description

The GC20N65T uses advanced super junction technology ar design to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for industry AC-DC SMPS requirement of PFC, AC/DC power conversion, and other industrial power applications.

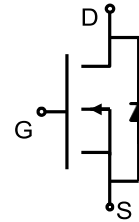
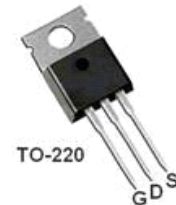
General Features

- Optimized body diode reverse recovery performance
- Low on-resistance and low conduction losses
- Small Package
- Ultra Low Gate Charge cause lower driving requirement
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power Factor Correction (PFC)
- Switched Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- LLC Half-bridge

V_{DS}	$R_{DS(ON)}$ @ 10V (Typ)	I_D
650V	150m Ω	20 A

**Schematic Diagram****Ordering Information**

Part Number	Marking	Case	Packaging
GC20N65T	GC20N65	TO-220	50pcs/Tube

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Drain Current-Continuous ($T_C=25^\circ\text{C}$)	I_D	20	A
Drain Current-Continuous ($T_C=100^\circ\text{C}$)	I_D	12	A
Drain Current-Pulsed (Note 1)	I_{DM}	60	A
Single Pulse Avalanche Energy (Note 2)	E_{AS}	484	mJ
Repetitive Avalanche Energy (Note 1)	E_{AR}	0.7	mJ
Avalanche Current (Note 1)	I_{AR}	3.5	A
Maximum Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	151	W
MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 480\text{V}$	dv/dt	50	V/ns
Reverse diode dv/dt , $V_{DS} = 0 \dots 480\text{V}$, $I_{SD} \leq I_D$	di_F/dt	15	V/ μs
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance,Junction-to-Case	R_{thJC}	0.83	$^{\circ}\text{C/W}$
Thermal Resistance,Junction-to-Ambient (Note 2)	R_{thJA}	62	$^{\circ}\text{C/W}$

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/ Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	650	-	-	V
Zero Gate Voltage Drain Current (T _C =25℃)	I _{DSS}	V _{DS} =650V,V _{GS} =0V	-	-	1	μA
Zero Gate Voltage Drain Current (T _C =125℃)	I _{DSS}	V _{DS} =650V,V _{GS} =0V	-	-	100	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±30V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2.5	-	4.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =10A	-	150	170	mΩ
Gate resistance	R _G	f = 1.0MHz open drain	-	12	-	Ω
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =100V,V _{GS} =0 V, F=1.0MHz	-	1724	-	PF
Output Capacitance	C _{OSS}		-	61	-	PF
Reverse Transfer Capacitance	C _{rSS}		-	6	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =400V,I _D =20A V _{GS} =10V,R _{GEN} =25Ω	-	15	-	ns
Turn-on Rise Time	t _r		-	59	-	ns
Turn-Off Delay Time	t _{d(off)}		-	121	-	ns
Turn-Off Fall Time	t _f		-	44	-	ns
Total Gate Charge	Q _g	V _{DD} =520V, I _D =20A, V _{GS} =10V	-	39	-	nC
Gate-Source Charge	Q _{gs}		-	8	-	nC
Gate-Drain Charge	Q _{gd}		-	15	-	nC
Drain-Source Diode Characteristics						
Continuous Body Diode Current	I _S	T _C =25℃	-	-	20	A
Pulsed Diode Forward Current	I _{SM}	T _C =25℃			60	A
Diode Forward Voltage	V _{SD}	T _J =25℃, I _{SD} =20A,V _{GS} =0V	-	-	1.2	V
Reverse Recovery Time	t _{rr}	V _R =400V, I _F =I _S , di _F /dt = 100A/ μ s		423		ns
Reverse Recovery Charge	Q _{rr}			5.3		μC
Peak Reverse Recovery Current	I _{rrm}		-	25	-	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. $I_{AS} = 3.5A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1\%$.
4. Guaranteed by design, not subject to production

Typical Electrical And Thermal Characteristics

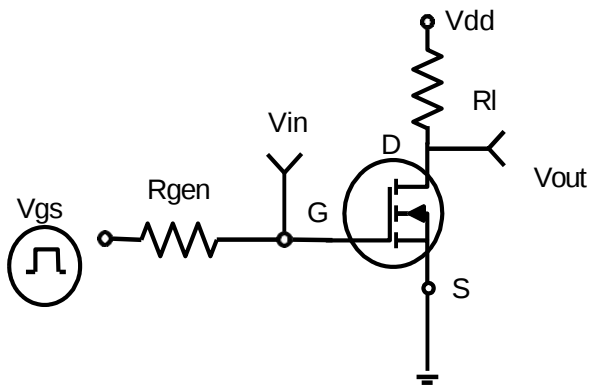


Figure 1. Switching Test Circuit

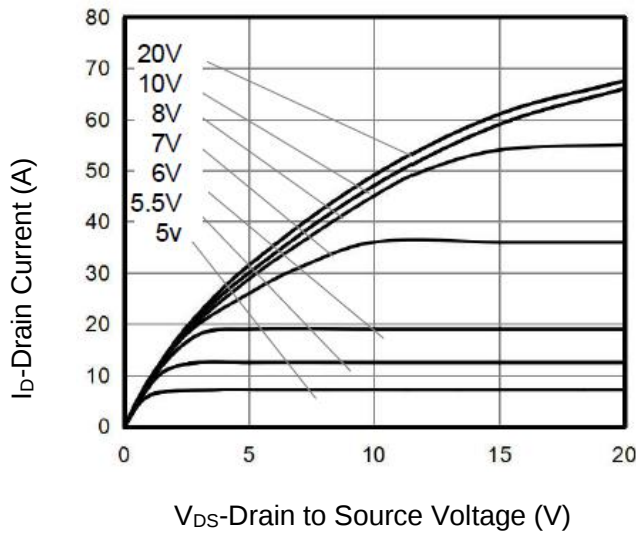


Figure 3. Output Characteristics

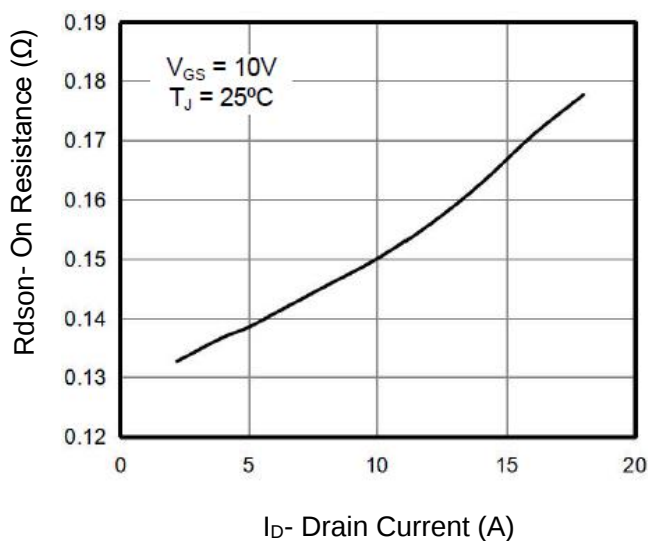


Figure 5. On Resistance vs. Drain Current

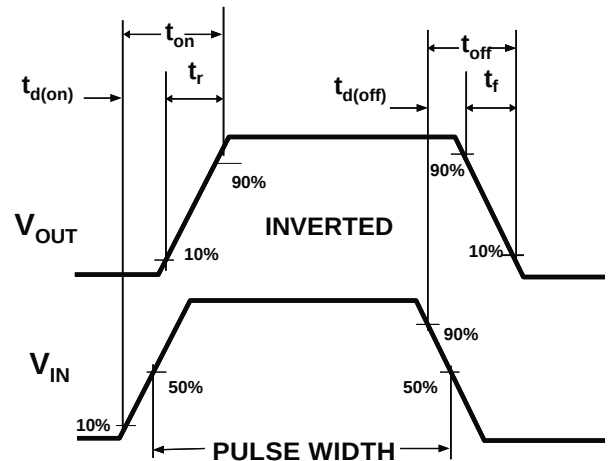


Figure 2. Switching Waveforms

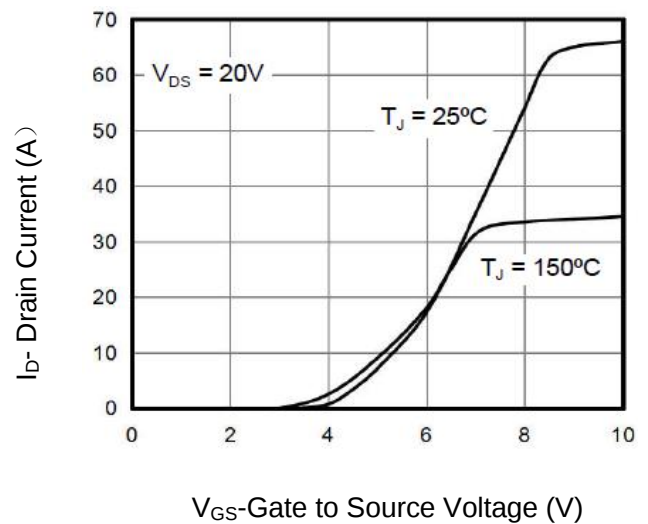


Figure 4. Transfer Characteristics

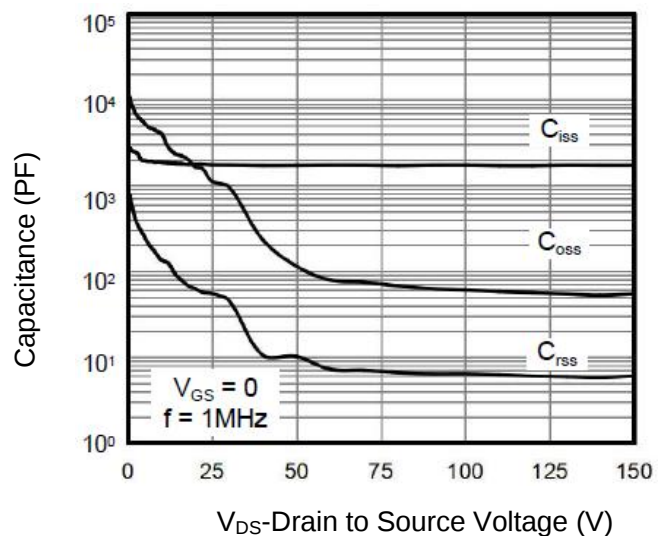


Figure 6. Capacitance

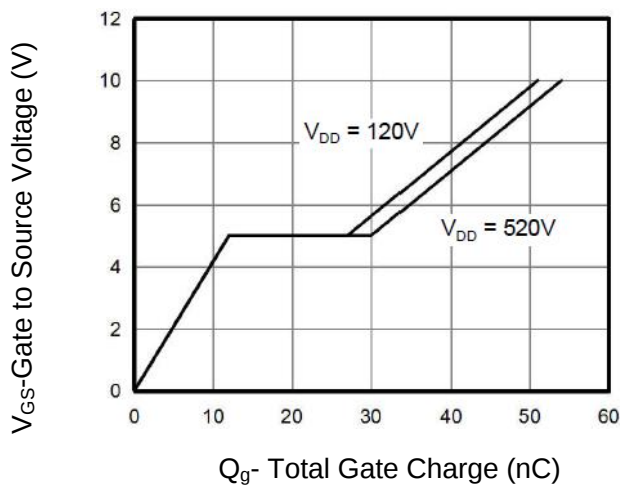


Figure 7. Gate Charge

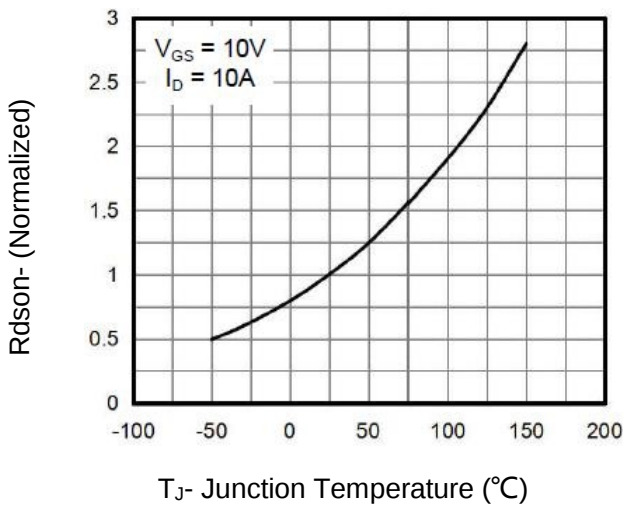


Figure 9. On- Resistance vs. Junction Temperature

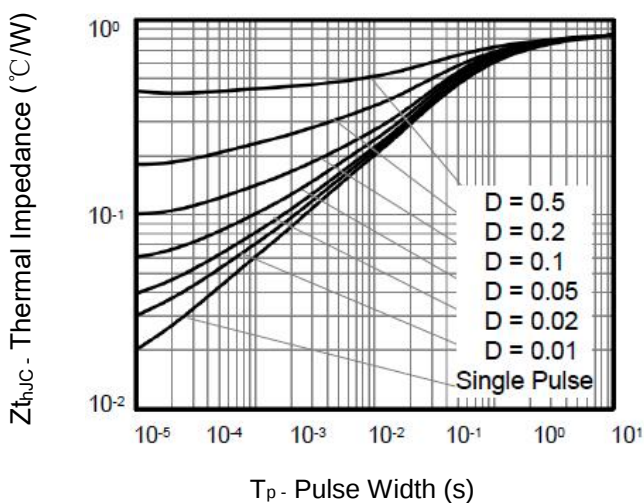


Figure 11. Transient Thermal Impedance

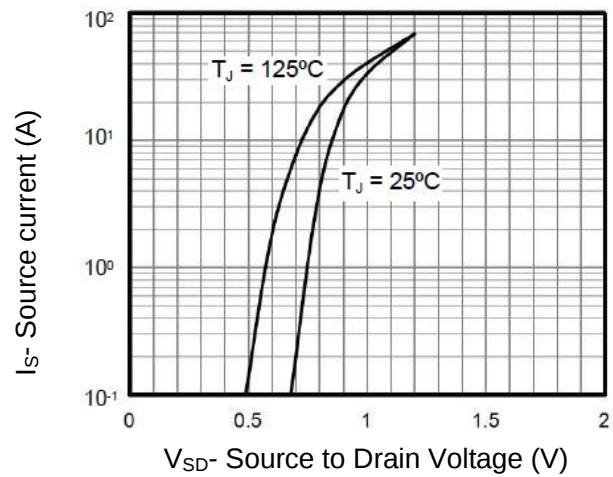


Figure 8. Body Diode Forward Voltage

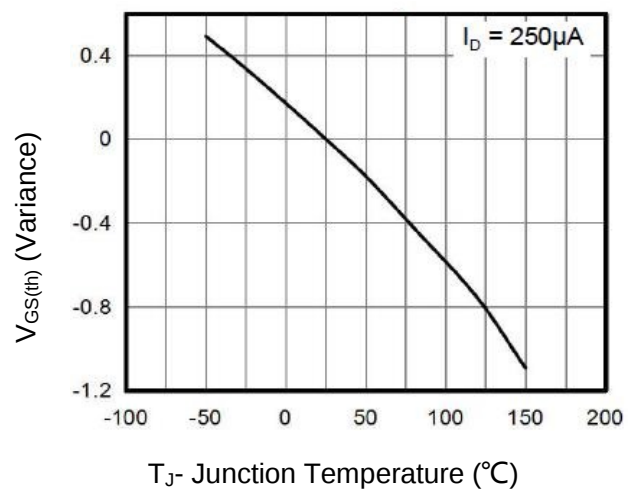


Figure 10. Threshold Voltage vs. Junction Temperature

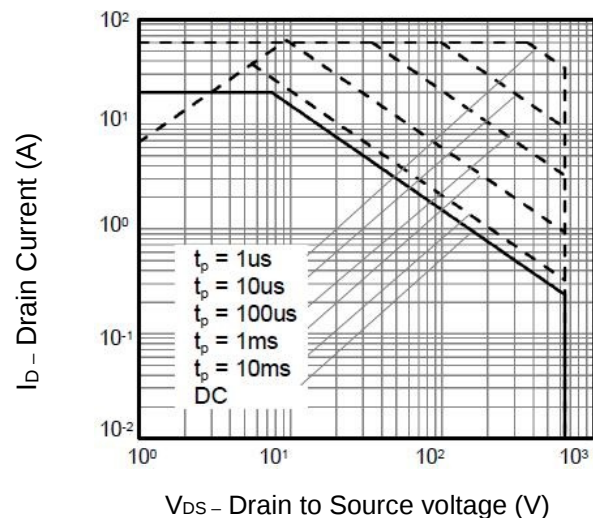
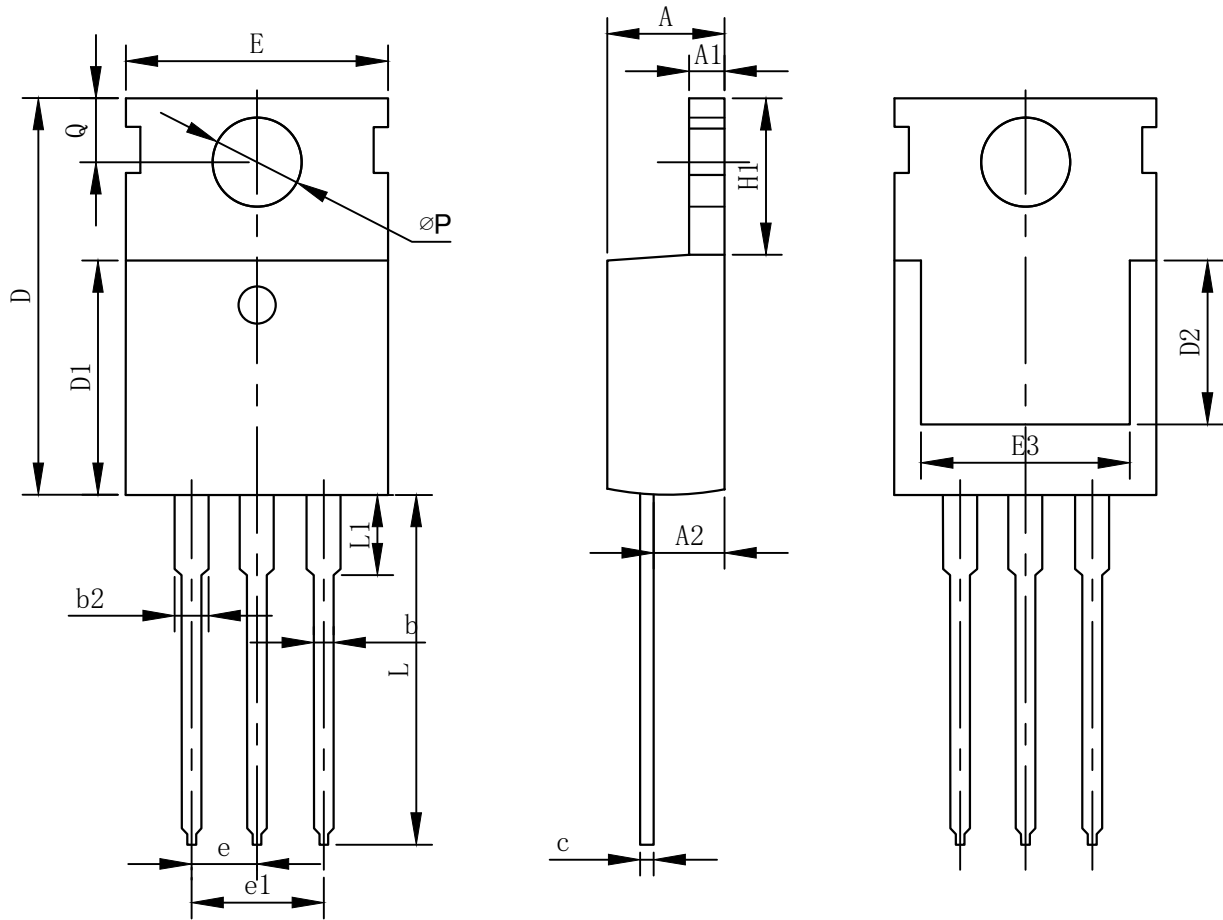


Figure 12. Safe Operation Area

TO-220 Package information



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.70	1.27	1.47
c	0.45	0.50	0.60
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	—	—
E	9.70	10.00	10.30
E3	7.00	—	—
e	2.54BSC		
e1	5.08BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	—	3.10	3.40
øP	3.40	3.60	3.80
Q	2.60	2.80	3.00