

N-Channel Enhancement Mode Power MOSFET

Description

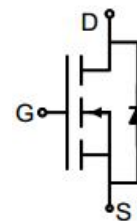
The GC125N65TF uses advanced super junction technology and design to provide excellent $R_{DS(on)}$, low gate charge and operation. This device is suitable for industry's AC-DC SMPS requirement for PFC, AC/DC power conversion, and industrial power application.

General Features

- V_{DS} 650V
- I_D (at $V_{GS} = 10V$) 25A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 125m Ω
- 100% Avalanche Tested
- RoHS Compliant
- Ultra-fast body diode

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-220

Ordering Information

Device	Package	Marking	Packaging
GC125N65TF	TO-220	GC125N65F	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
Continuous Drain Current	I_D	25	A
		16	
Pulsed Drain Current (note1)	I_{DM}	75	A
Gate-Source Voltage	V_{GS}	± 30	V
Power Dissipation	P_D	200	W
Single pulse avalanche energy (note2)	E_{AS}	20	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	R_{thJC}	0.63	$^\circ\text{C/W}$

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

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	650	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V	--	--	5	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	3.2	4.0	4.6	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 12A	--	106	125	mΩ
Forward Transconductance	g _{FS}	V _{DS} = 5V, I _D = 12 A	--	13	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 400V, f = 0.5MHz	--	1600	--	pF
Output Capacitance	C _{oss}		--	50	--	
Reverse Transfer Capacitance	C _{rss}		--	6	--	
Total Gate Charge	Q _g	V _{DD} = 400V, I _D = 12A, V _{GS} = 10V	--	52	--	nC
Gate-Source Charge	Q _{gs}		--	14	--	
Gate-Drain Charge	Q _{gd}		--	30	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 400V, I _D = 12A, R _G = 2Ω	--	25	--	ns
Turn-on Rise Time	t _r		--	50	--	
Turn-off Delay Time	t _{d(off)}		--	65	--	
Turn-off Fall Time	t _f		--	28	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	25	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 12A, V _{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = 12A, V _{GS} = 0V di/dt=100A/us	--	0.4	--	μC
Reverse Recovery Time	T _{rr}		--	97	--	ns

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : $T_J = 25^\circ\text{C}$, $V_{DD} = 50V$, $V_{GS} = 10V$, $L = 10mH$, $R_G = 25\Omega$

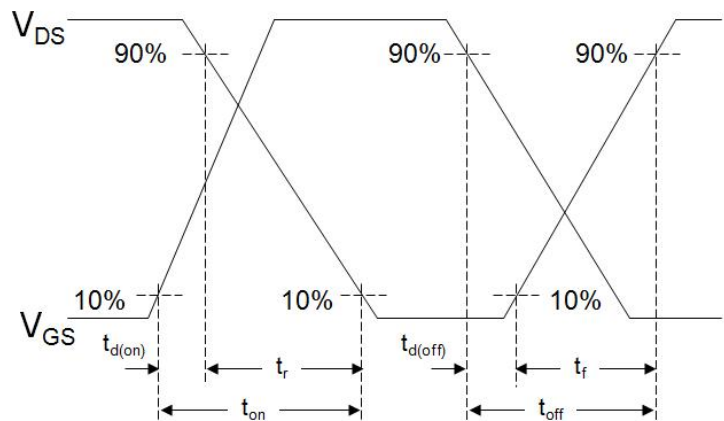
The table shows the minimum avalanche energy, which is 80mJ when the device is tested until failure

3. Identical low side and high side switch with identical R_G

Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

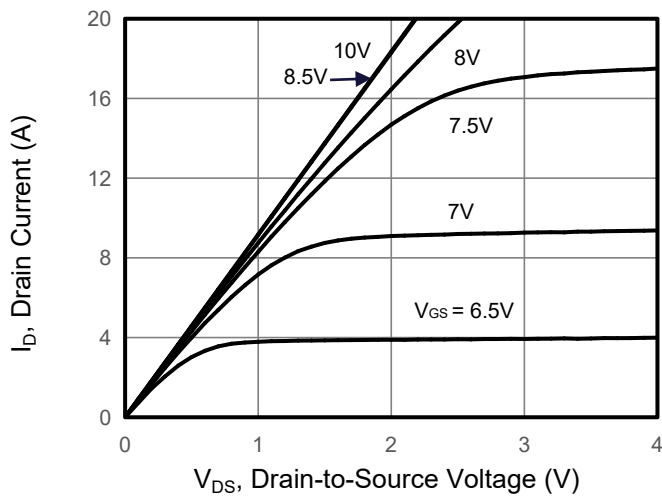


Figure 2. Transfer Characteristics

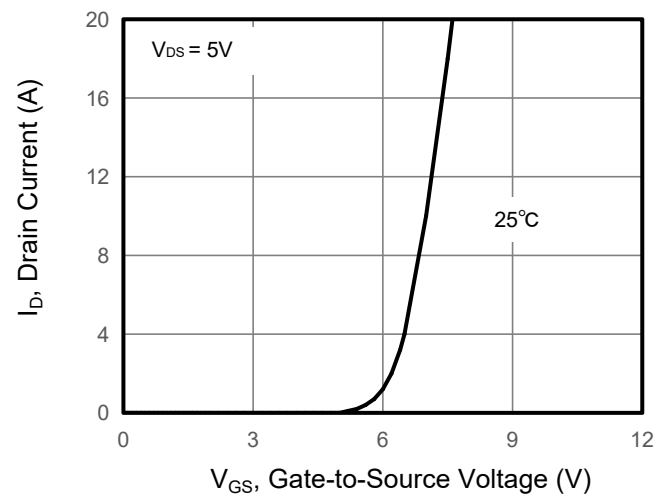


Figure 3. Drain Source On Resistance

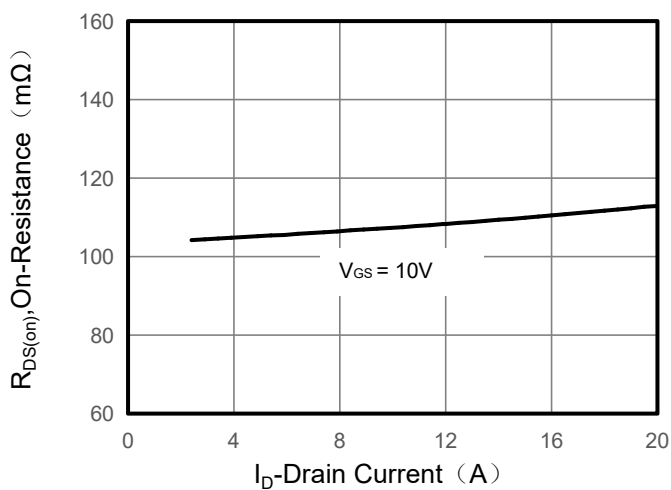


Figure 4. Gate Charge

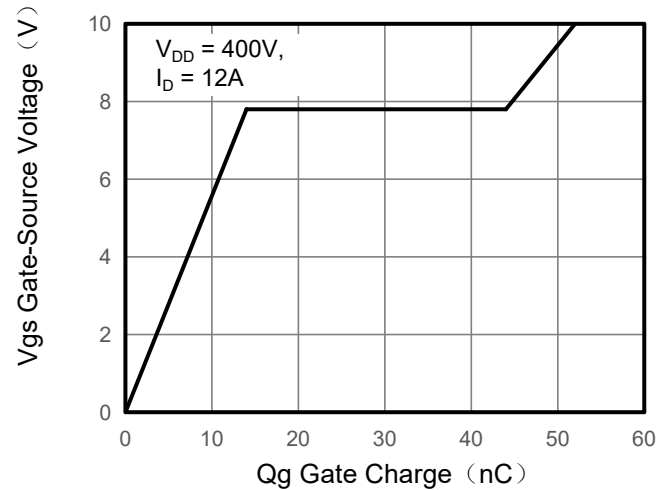


Figure 5. Capacitance

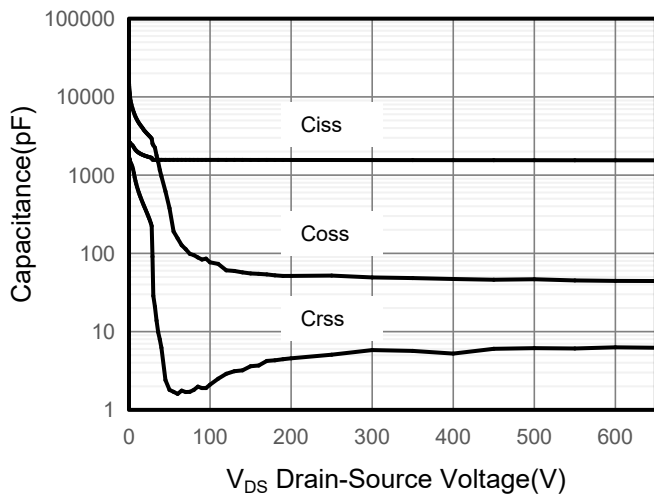
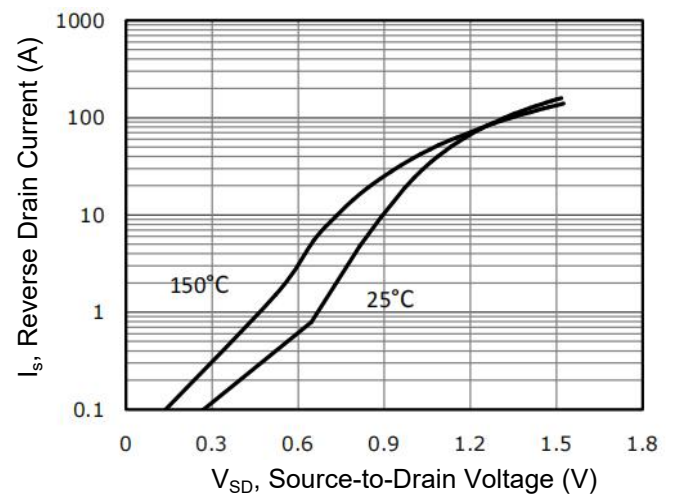


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

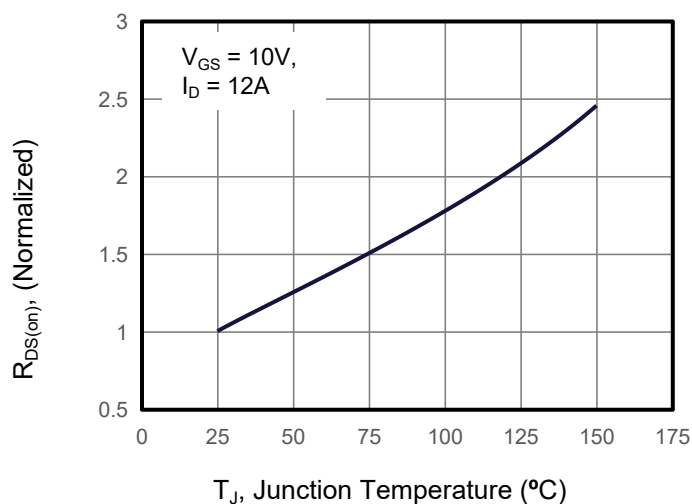


Figure 8. Safe Operation Area

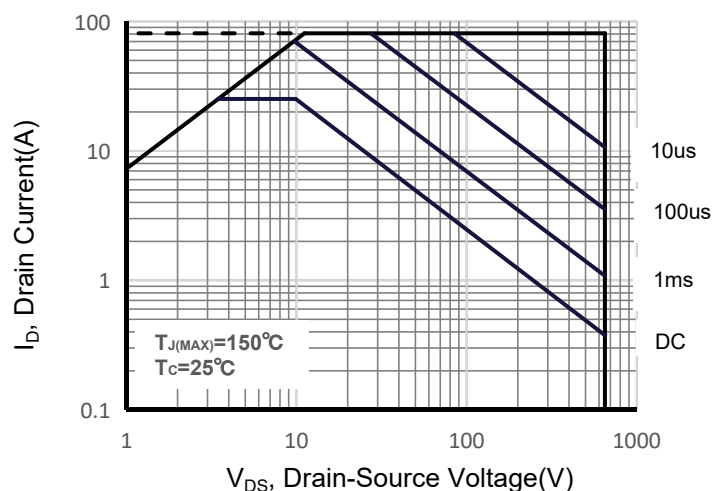


Figure 9. Maximum Continuous Drain Current vs Case Temperature

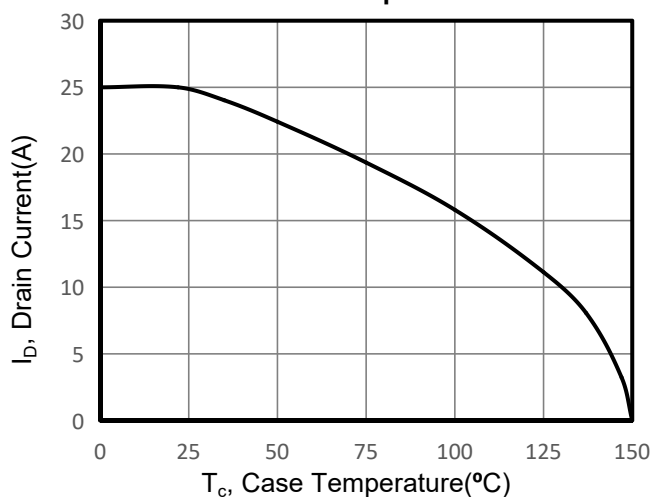
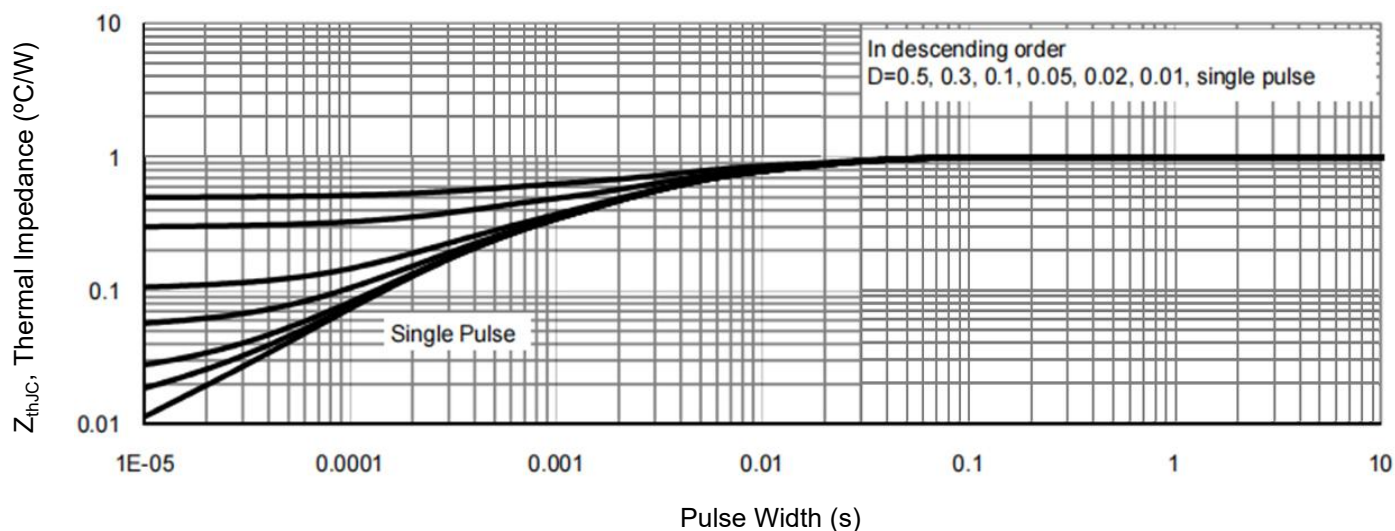
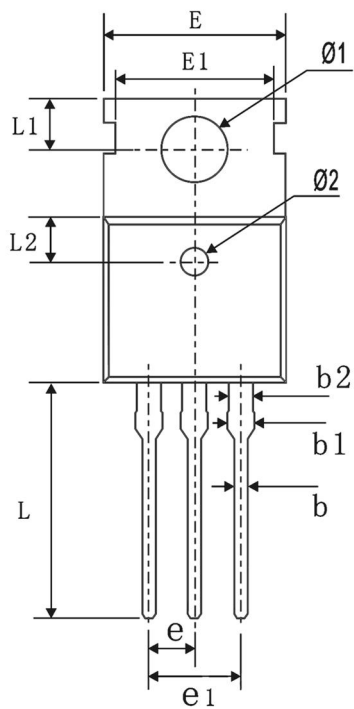


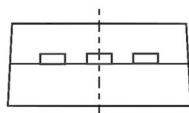
Figure 10. Normalized Maximum Transient Thermal Impedance



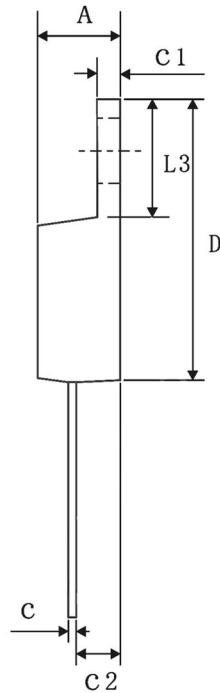
TO-220 Package Information



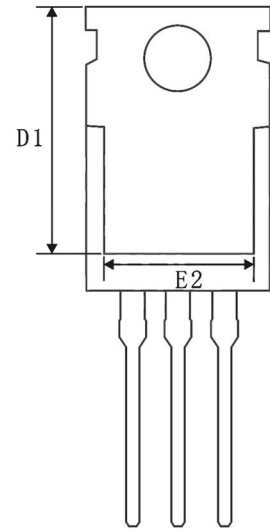
TOP VIEW



SIDE VIEW



SIDE VIEW



BOTTOM VIEW

COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	4.30	4.50	4.70
b	0.70	0.80	0.90
b 1	—	—	1.42
b 2	1.17	1.27	1.37
c	0.40	0.50	0.60
c 1	1.25	1.30	1.35
c 2	2.20	2.40	2.60
D	15.45	15.65	15.85
D 1	13.20	13.40	13.60
E	9.80	10.0	10.2
E 1	8.60	8.70	8.80
E 2	7.80	8.00	8.20
e 1	4.88	5.08	5.28
L	12.95	13.15	13.35
L 1	2.70	2.80	2.90
L 2	2.40	2.50	2.60
L 3	6.30	6.50	6.70
Ø1	3.50	3.60	3.70
Ø2	1.35	1.50	1.65
e	2.54BSC		