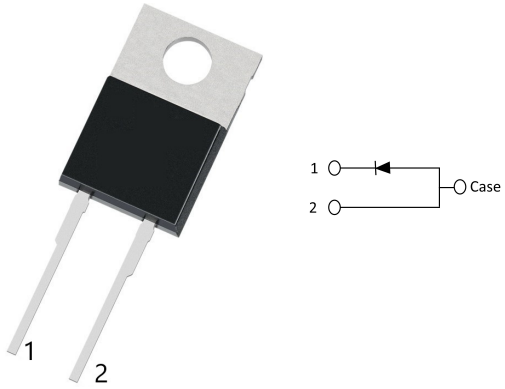
NEOTON Optronics Corporation

Soft Recovery GaN Schottky Diode

NT1D11065T
650V,10A

Description

The Schottky diodes employ a wide bandgap Gallium Nitride (GaN) material that ensures a 650 V rating. The diodes show no recovery at turn-off with negligible ringing patterns. Their minimal capacitive turn-off behavior is independent of temperature. The superior switching performance of GaN Schottky diodes improves system efficiency as compared to Silicon diodes.



Part Number	Package	Marking
NT1D11065T	TO-220-2L	1D11065

Features and benefits

- Reduces conduction losses by lower V_F during extreme light load conditions
- Reduces switching losses in commutation between diodes and associated MOSFETs
- Lower EMI than FRD & SiC due to the higher softness factor(T_S) known as a soft-recovery
- Extremely fast switching, temperature independent, no thermal runaway issue, better thermal conductivity due to lower $R_{\theta JC}$
- Positive temperature coefficient on V_F, suitable for parallel commutation configuration in high power
- System cost and size savings due to the reduced cooling and EMI requirements

Applications

- Power factor correction modules
- Secondary side rectification
- Anti-Parallel Diode (Switchmode Power Supply, Inverters)
- Free Wheeling Diode (Motor Controllers, Converters, Inverters)
- Snubber Diode

Maximum Ratings (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Value	Units
DC Peak reverse voltage	V_R		650	V
Repetitive peak reverse voltage	V_{RRM}		650	V
Surge peak reverse voltage	V_{RSM}		650	V
Continuous forward current	I_F	T_C = 125°C	10	A
Non-repetitive forward surge current sine halfwave	I_{FSM}	T_C = 25°C, t_p = 10ms	40	A
		T_C = 125°C, t_p =10ms	35	
Power dissipation	P_{Tot}	T_C = 25°C	96	W
		T_C = 125°C	19	
Maximum junction temperature	$T_{J,max}$		150	°C
Operating and storage temperature	T_J, T_{STG}		-55 to 150	°C
Soldering temperatures, wavesoldering only allowed at leads	T_{sold}	1.6mm from case for 10s	260	°C

Electrical Characteristics (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Forward voltage	V_F	I_F=100mA, T_J=25°C		0.55		V
		I_F=10A, T_J=25°C		1.55	1.75	
		I_F=10A, T_J=150°C		2.15	2.35	
Reverse current	I_R	V_R=650V, T_J=25°C		30		µA
		V_R=650V, T_J=150°C		320		
Total capacitive charge (1)	Q_C	V_R=400V di/dt=300A/us		38		nC
Total capacitance	C	V_R=1V, f=1MHz		915		pF
		V_R=300V, f=1MHz		108		
		V_R=600V, f=1MHz		78		
Softness Factor (tb/ta)	T_S	V_R=400V di/dt=300A/us		3.6		

(1) Q_c is independent on T_J, di_F/dt, and I_F as shown in the application note

Thermal characteristics

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Thermal resistance, junction - case	$R_{\theta JC}$			1.3		°C/W

Typical Performance

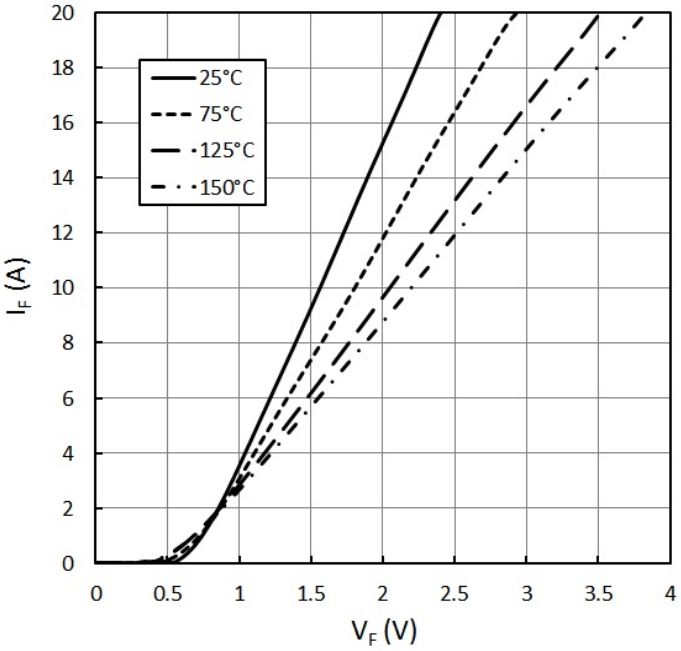


Figure 1 Typical forward characteristics

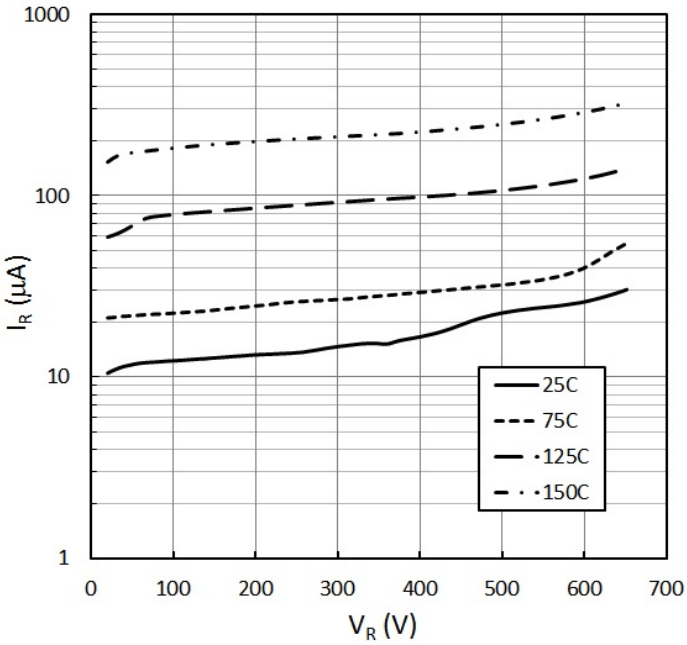


Figure 2 Typical reverse characteristics

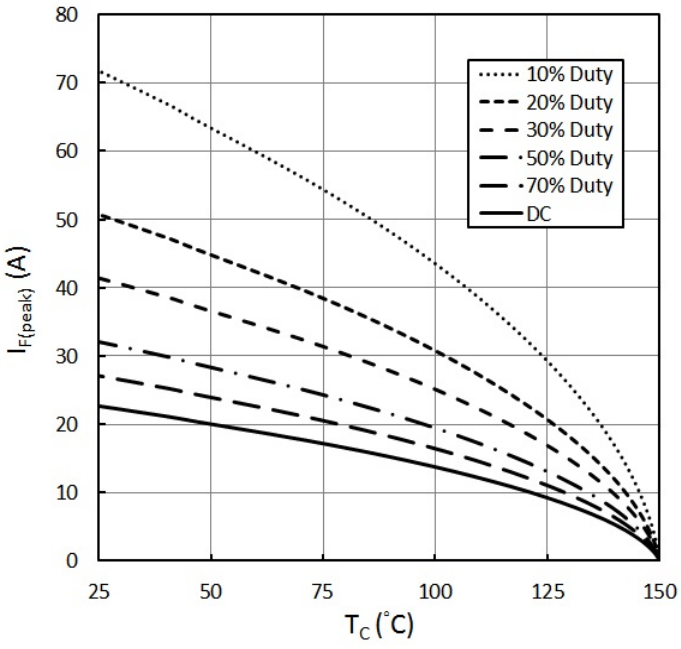


Figure 3 Current Derating

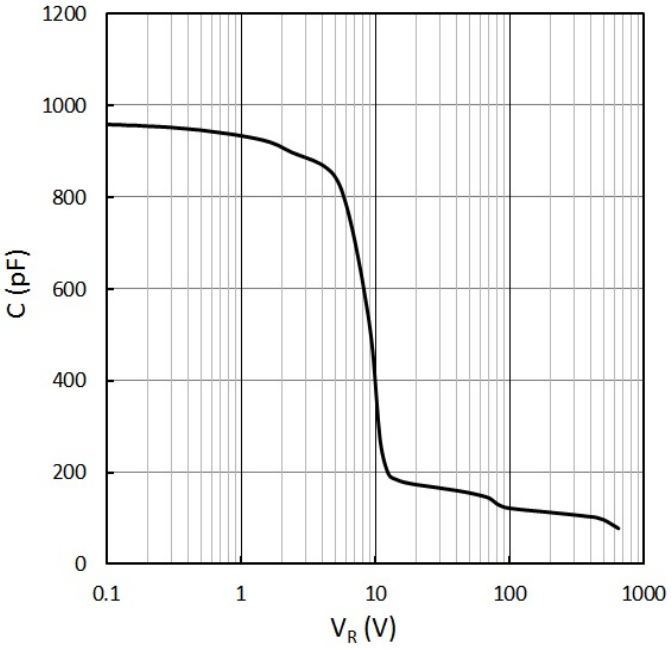


Figure 4 Capacitance vs. reverse voltage at 1MHz

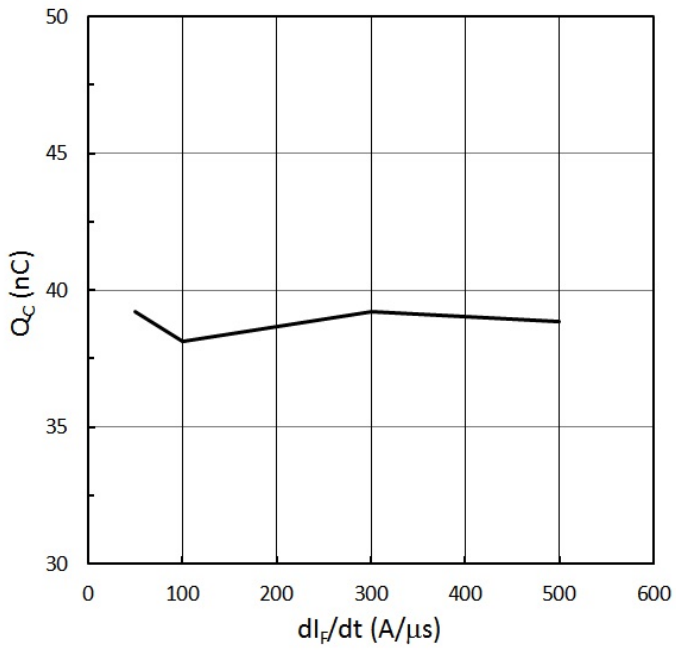


Figure 5 Capacitance charge vs. current slope

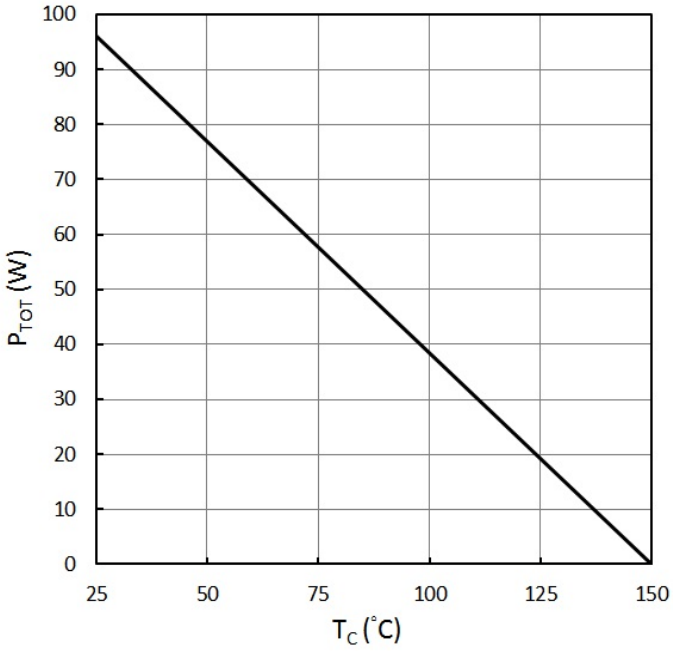
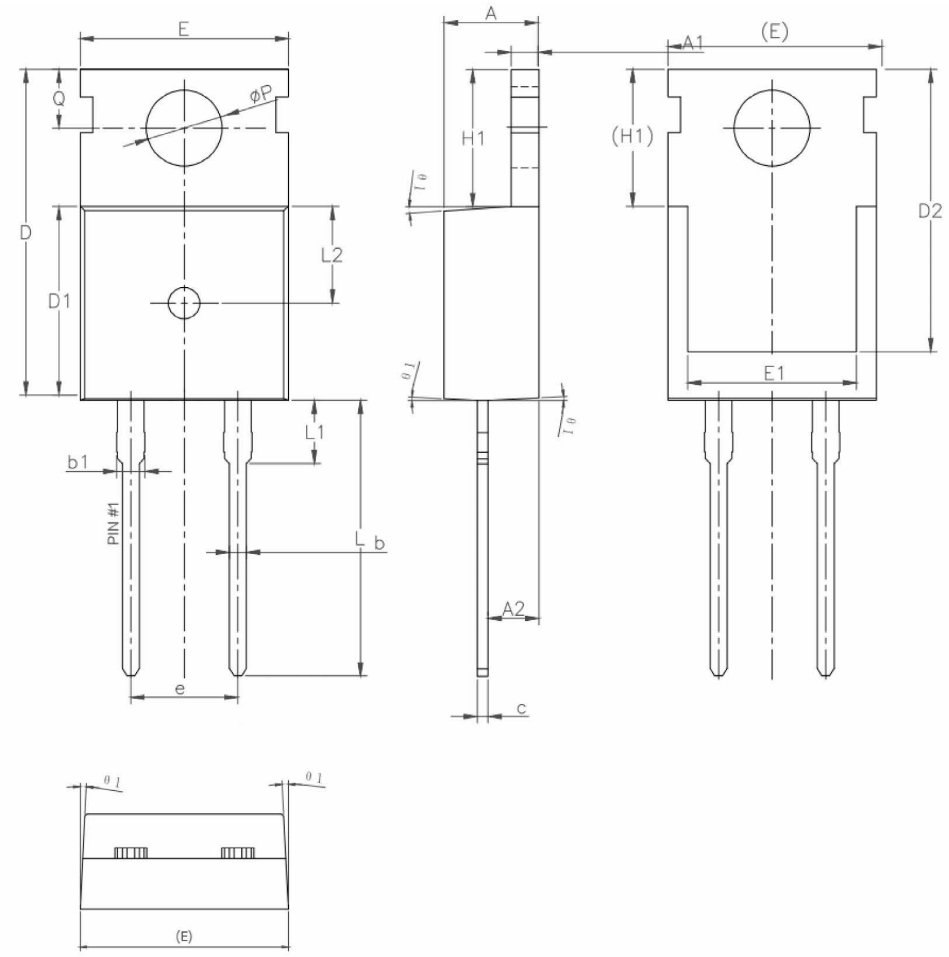


Figure 6 Power dissipation

Package information

TO-220-2L dimensions in mm



SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	–	0.90
b1	–	–	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	–	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	–	–	3.50
L2	4.60REF		
ΦP	3.55	3.60	3.65
Q	2.73	–	2.87
θ1	1°	3°	5°