

Features

- 650-Volt Schottky Rectifier
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on V_F

Benefits

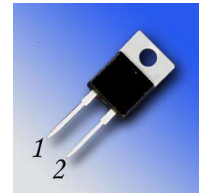
- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

Applications

- Switch Mode Power Supplies (SMPS)
- Boost diodes in PFC or DC/DC stages
- Free Wheeling Diodes in Inverter stages
- AC/DC converters

Part Number	Package	Marking
F3C20065A	TO-220-2	C20065A

Package



TO-220-2(TO-220AC)



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

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		V_{RM}	650	V
Reverse voltage (DC)		V_R	650	V
Continuous forward current ($T_c=125^\circ\text{C}$)		I_F	20	A
Surge non-repetitive forward current	PW=10ms sinusoidal, $T_j=25^\circ\text{C}$	I_{FSM}	123	A
	PW=10ms sinusoidal, $T_j=150^\circ\text{C}$		104	A
	PW=10μs square, $T_j=25^\circ\text{C}$		450	A
Repetitive peak forward current		I_{FRM}	81 *1	A
i^2t value	$1 \leq PW \leq 10\text{ms}$, $T_j=25^\circ\text{C}$	$\int i^2 dt$	75	A^2s
	$1 \leq PW \leq 10\text{ms}$, $T_j=150^\circ\text{C}$		54	A^2s
Total power dissipation		P_D	115*2	W
Junction temperature		T_j	175	$^\circ\text{C}$
Range of storage temperature		T_{stg}	-55 to +175	$^\circ\text{C}$

*1 $T_c=100^\circ\text{C}$, $T_j=150^\circ\text{C}$, Duty cycle=10% *2 $T_c=25^\circ\text{C}$

Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	$I_R = 100\mu A$	650	-	-	V
Forward voltage	V_F	$I_F = 20A, T_J = 25^\circ C$	-	1.35	1.50	V
		$I_F = 20A, T_J = 150^\circ C$	-	1.44	1.71	V
		$I_F = 20A, T_J = 175^\circ C$	-	1.50	-	V
Reverse current	I_R	$V_R = 650V, T_J = 25^\circ C$	-	0.06	100	μA
		$V_R = 650V, T_J = 150^\circ C$	-	4	400	μA
		$V_R = 650V, T_J = 175^\circ C$	-	12	-	μA
Total capacitance	C	$V_R = 1V, f = 1MHz$	-	1000	-	pF
		$V_R = 650V, f = 1MHz$	-	91	-	pF
Total capacitive charge	Q_C	$V_R = 400V, di/dt = 350A/\mu s$	-	47	-	nC
Switching time	t_C	$V_R = 400V, di/dt = 350A/\mu s$	-	25	-	ns
Non-repetitive Avaranche Energy	E_{ava}	$L = 1mH$	-	220	-	mJ

Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	-	-	0.87	1.3	$^\circ C/W$

Electrical characteristic curves

Fig.1 $V_F - I_F$ Characteristics

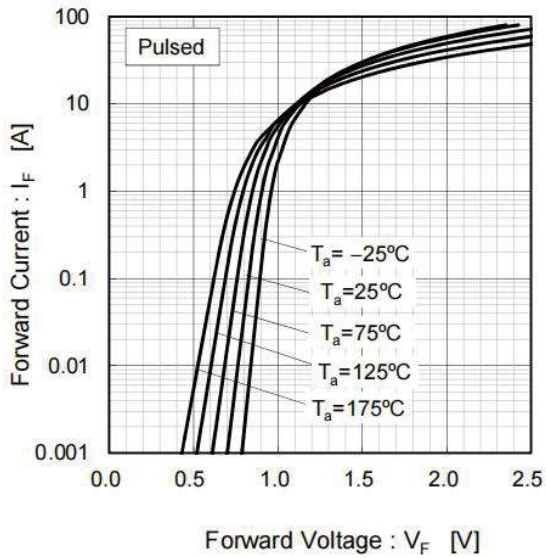


Fig.2 $V_F - I_F$ Characteristics

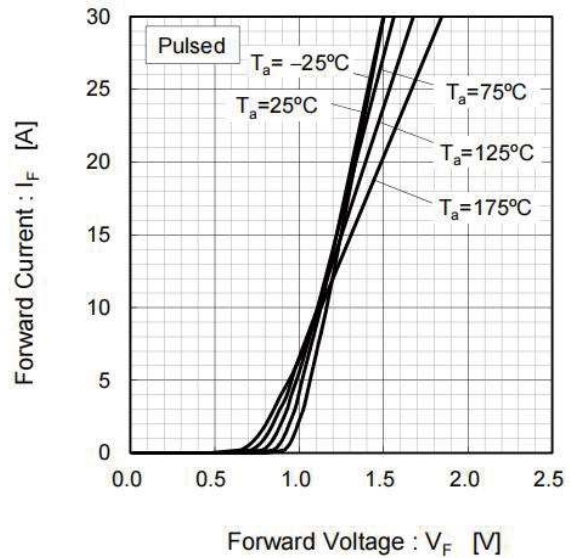


Fig.3 $V_R - I_R$ Characteristics

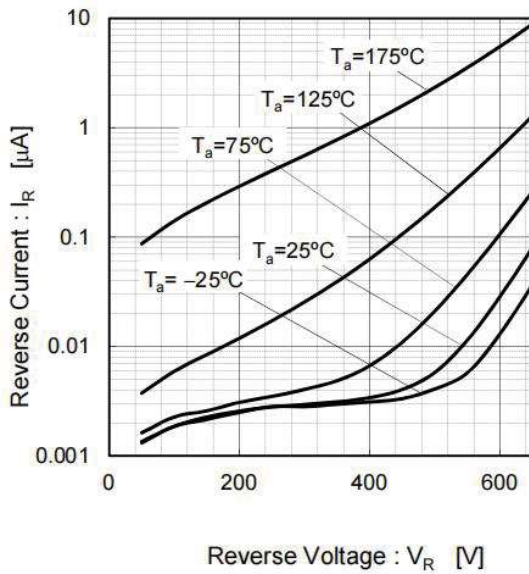
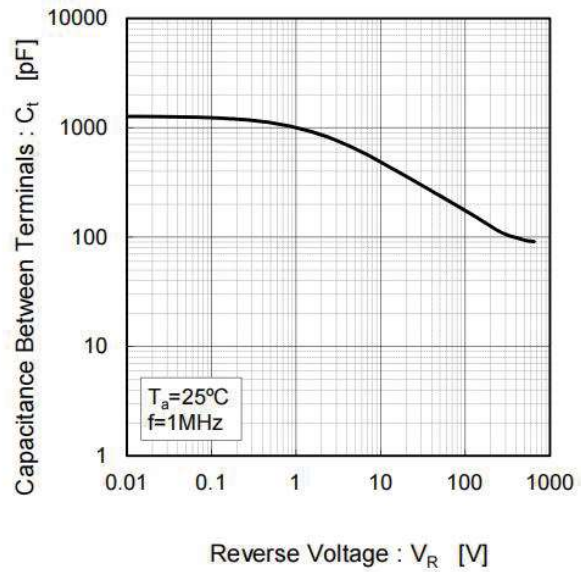


Fig.4 $V_R - C_t$ Characteristics



Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

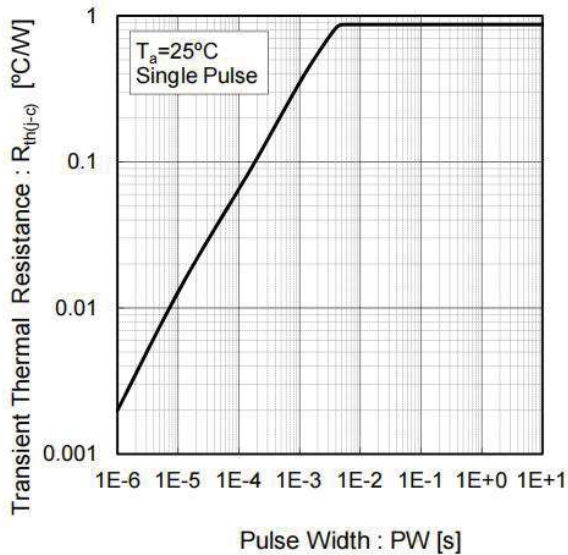


Fig.6 Power Dissipation

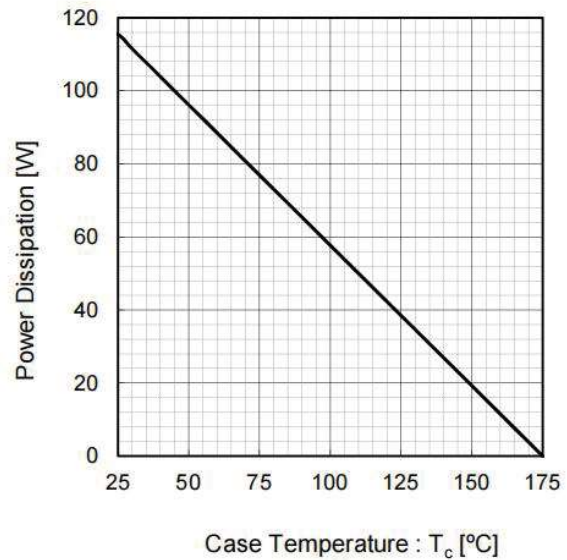
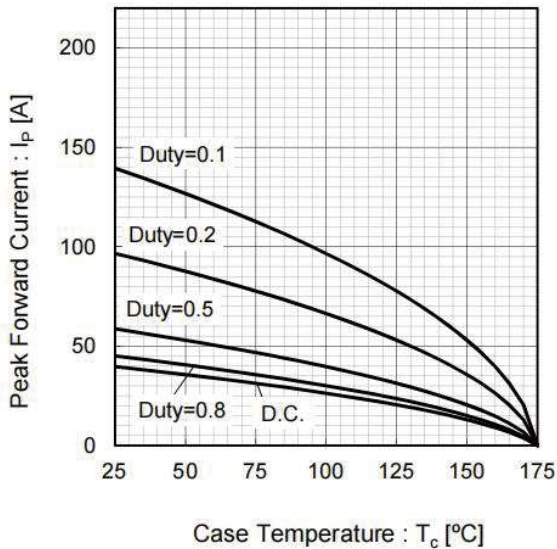
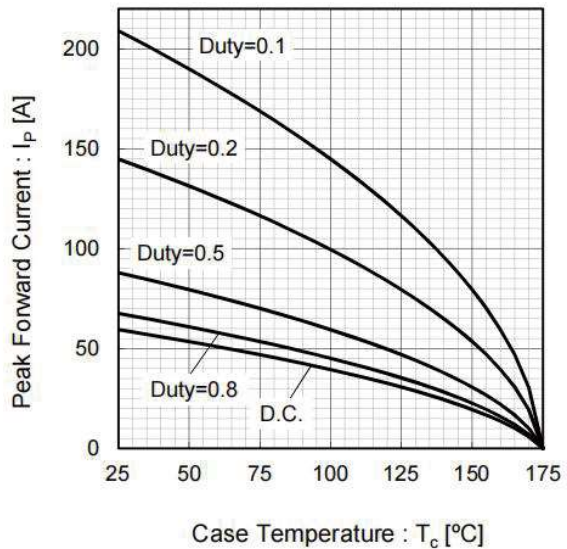


Fig.7*3 Maximum peak forward current derating curve $I_P - T_c$



*3 Based on max V_f , max $R_{th(j-c)}$
Valid for switching of above 10kHz,
excluding D.C. curve.

Fig.8*4 Typical peak forward current derating curve $I_P - T_c$ (Not guaranteed)



*4 Based on typ V_f , typ $R_{th(j-c)}$
Typical value, not guaranteed
Valid for switching of above 10kHz,
excluding D.C. curve

Electrical characteristic curves

Fig.9 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform)

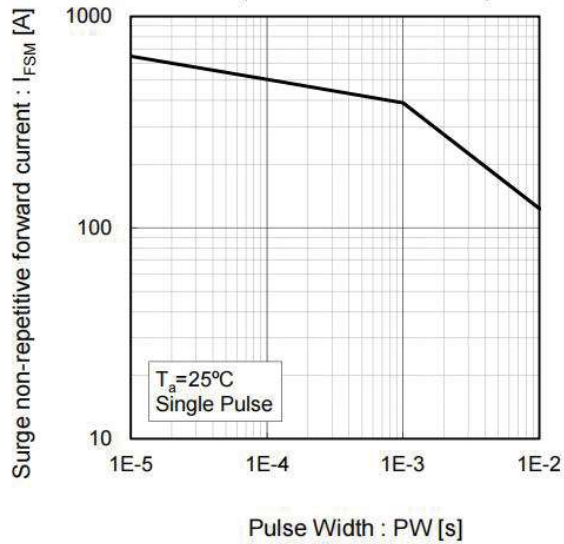


Fig.10 Typical capacitance store energy

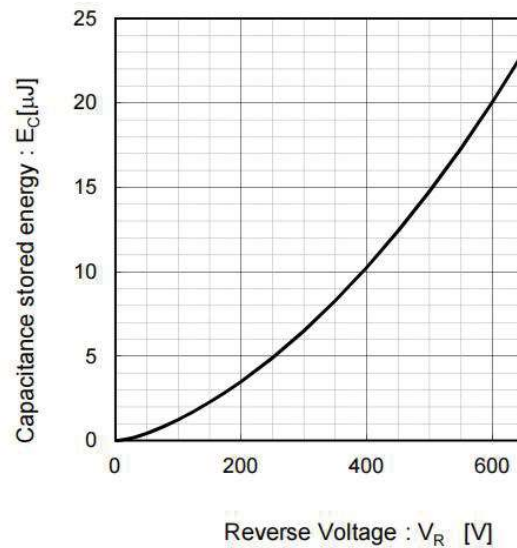
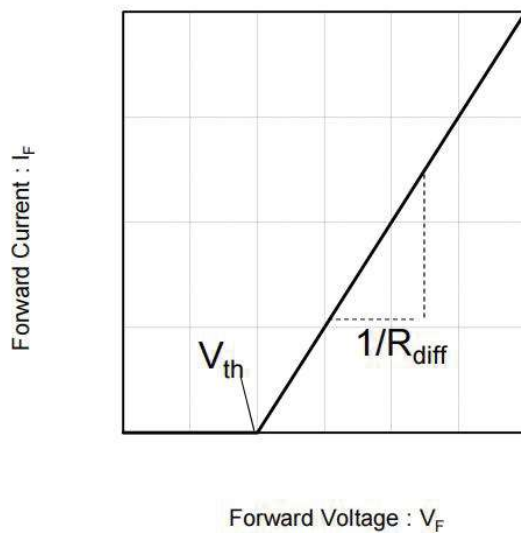


Fig.11 Equivalent forward current curve



$$V_F = V_{th} + R_{diff} I_F$$

$$V_{th}(T_j) = a_0 + a_1 T_j$$

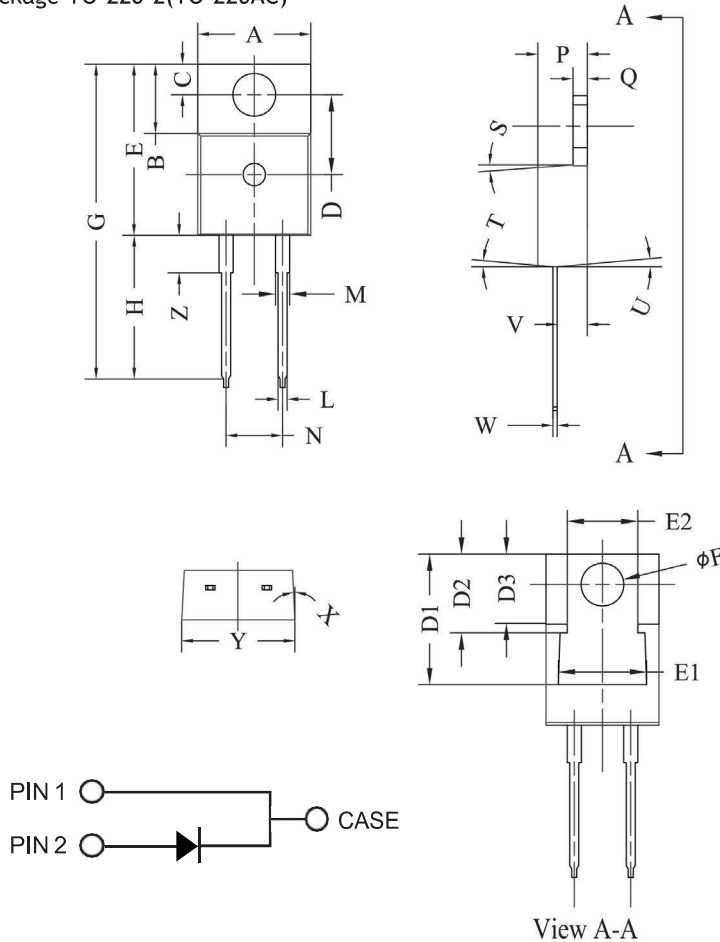
$$R_{diff}(T_j) = b_0 + b_1 T_j + b_2 T_j^2$$

Symbol	Typical Value	Unit
a_0	9.66E-01	V
a_1	- 1.10E-03	V/°C
b_0	1.76E-02	Ω
b_1	3.73E-05	Ω/°C
b_2	3.84E-07	Ω/°C ²

T_j in °C; $-55^\circ\text{C} < T_j < 175^\circ\text{C}$; $I_F < 40\text{A}$

Package Dimensions

Package TO-220-2(TO-220AC)

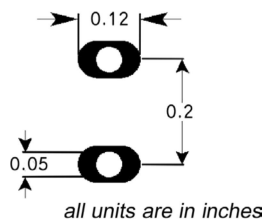


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.381	.410	9.677	10.414
B	.232	.272	5.900	6.900
C	.100	.120	2.540	3.048
D	.223	.337	5.664	8.560
D1	.457-.490		11.60-12.45 typ	
D2	.277-.303 typ		7.04-7.70 typ	
D3	.244-.252 typ		6.22-6.4 typ	
E	.587	.638	14.900	16.200
E1	.302	.326	7.68	8.28
E2	.227	.251	5.77	6.37
F	.143	.153	3.632	3.886
G	1.105	1.147	28.067	29.134
H	.500	.550	12.700	13.970
L	.025	.036	.635	.914
M	.045	.055	1.143	1.550
N	.195	.205	4.953	5.207
P	.165	.185	4.191	4.699
Q	.048	.054	1.219	1.372
S	3°	6°	3°	6°
T	3°	6°	3°	6°
U	3°	6°	3°	6°
V	.094	.110	2.388	2.794
W	.014	.025	.356	.635
X	3°	5.5°	3°	5.5°
Y	.385	.410	9.779	10.414
z	.130	.150	3.302	3.810

NOTE:

1. Dimension L, M, W apply for Solder Dip Finish

Recommended Solder Pad Layout



TO-220-2(TO-220AC)