

V_R	650V
I_F	12A
Q_C	18nC

●Outline

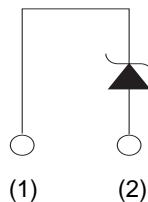
TO-220FM



●Features

- 1) Shorter recovery time
- 2) Reduced temperature dependence
- 3) High-speed switching possible

●Inner circuit



(1) Cathode
(2) Anode

●Applications

- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Packing code	C
	Marking	SCS212AM

●Absolute maximum ratings ($T_j = 25^\circ\text{C}$)

Parameter	Symbol	Value	Unit
Reverse voltage (repetitive peak)	V_{RM}	650	V
Reverse voltage (DC)	V_R	650	V
Continuous forward current ($T_c = 75^\circ\text{C}$)	I_F	12	A
Surge non-repetitive forward current	I_{FSM}	43	A
		34	A
		170	A
Repetitive peak forward current	I_{FRM}	32 * ¹	A
i^2t value	$\int i^2 dt$	9.2	A^2s
		5.7	A^2s
Total power dissipation	P_D	37 * 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 ($T_j = 25^\circ\text{C}$)

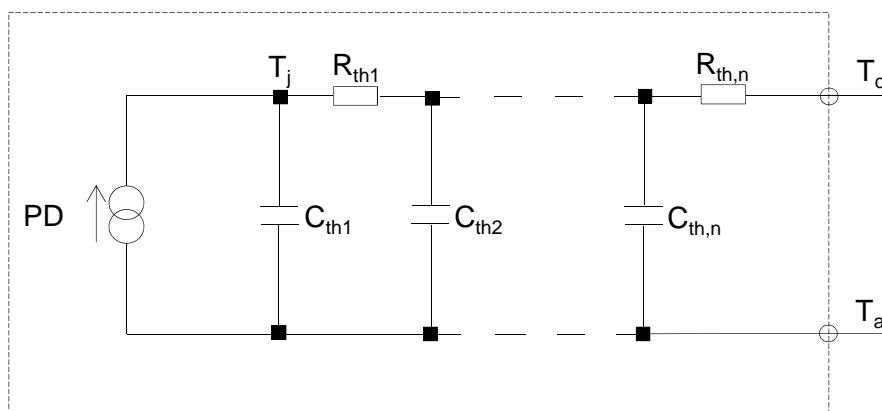
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	$I_R = 2.4\text{mA}$	650	-	-	V
Forward voltage	V_F	$I_F = 12\text{A}, T_j = 25^\circ\text{C}$	-	1.35	1.55	V
		$I_F = 12\text{A}, T_j = 150^\circ\text{C}$	-	1.55	-	V
		$I_F = 12\text{A}, T_j = 175^\circ\text{C}$	-	1.63	-	V
Reverse current	I_R	$V_R = 650\text{V}, T_j = 25^\circ\text{C}$	-	2.4	240	μA
		$V_R = 650\text{V}, T_j = 150^\circ\text{C}$	-	36	-	μA
		$V_R = 650\text{V}, T_j = 175^\circ\text{C}$	-	84	-	μA
Total capacitance	C	$V_R = 1\text{V}, f = 1\text{MHz}$	-	440	-	pF
		$V_R = 600\text{V}, f = 1\text{MHz}$	-	44	-	pF
Total capacitive charge	Q_C	$V_R = 400\text{V}, di/dt = 350\text{A}/\mu\text{s}$	-	18	-	nC
Switching time	t_C	$V_R = 400\text{V}, di/dt = 350\text{A}/\mu\text{s}$	-	16	-	ns

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	-	-	3.4	4.0	$^\circ\text{C}/\text{W}$

●Typical Transient Thermal Characteristics

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	6.06E-01	K/W	C_{th1}	2.09E-03	Ws/K
R_{th2}	1.29E+00		C_{th2}	7.52E-03	
R_{th3}	1.51E+00		C_{th3}	7.44E-01	



● Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

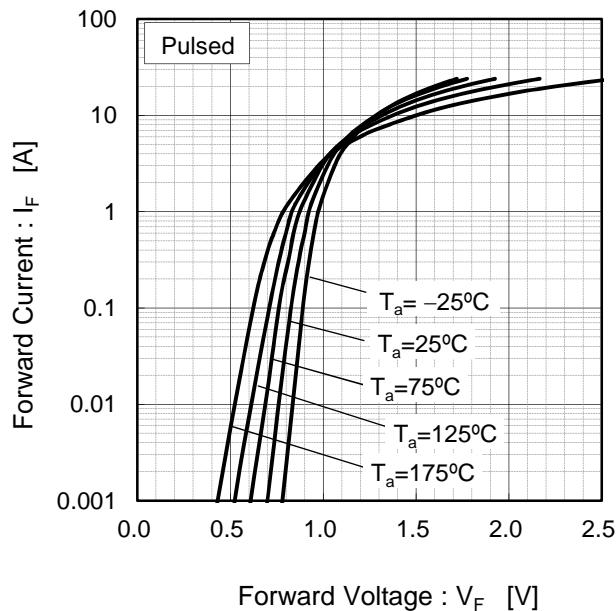


Fig.2 V_F - I_F Characteristics

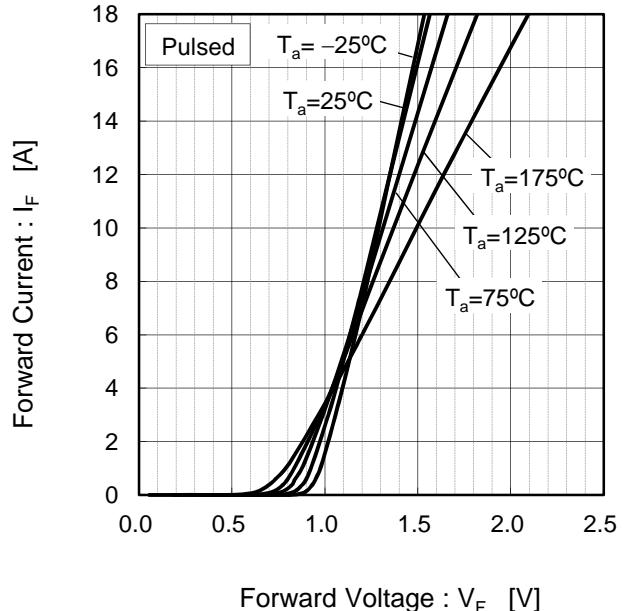


Fig.3 V_R - I_R Characteristics

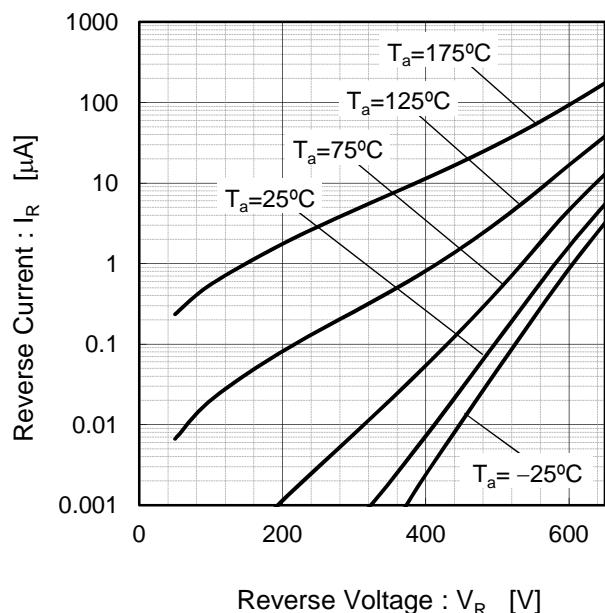
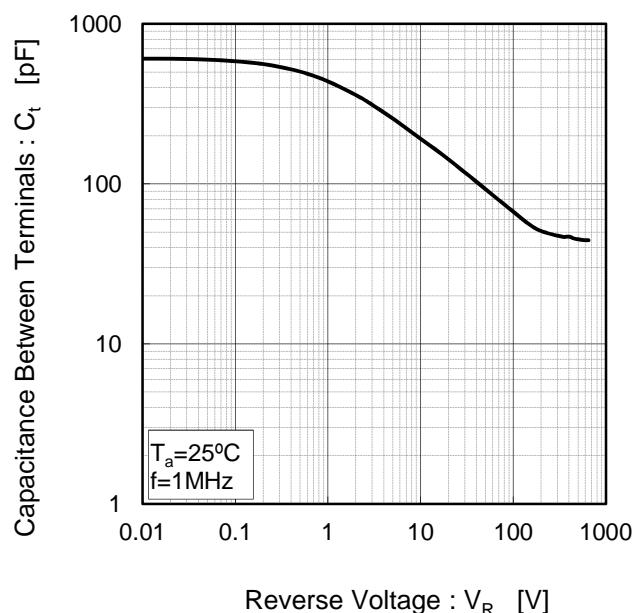


Fig.4 V_R - C_t Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

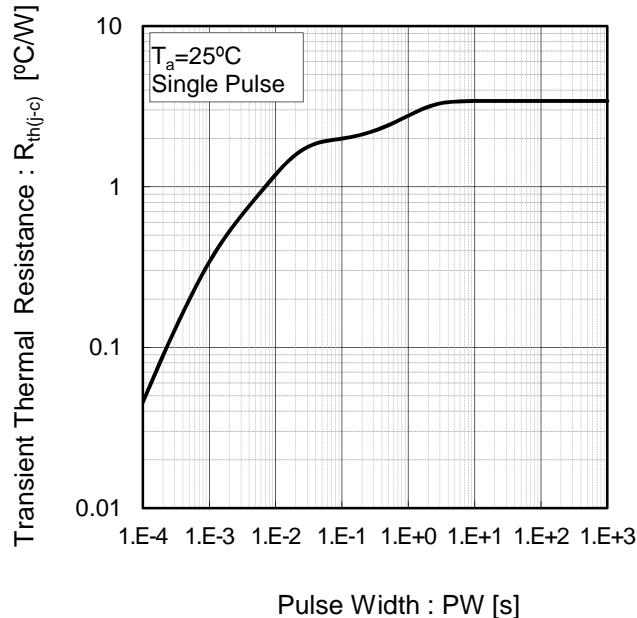


Fig.6 Power Dissipation

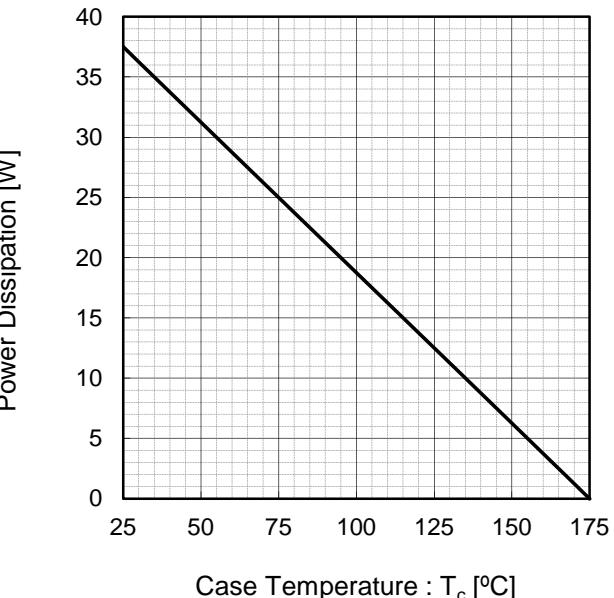
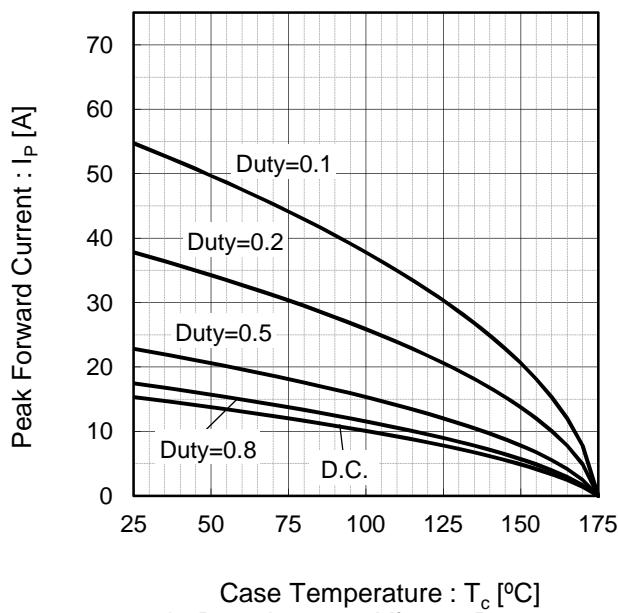
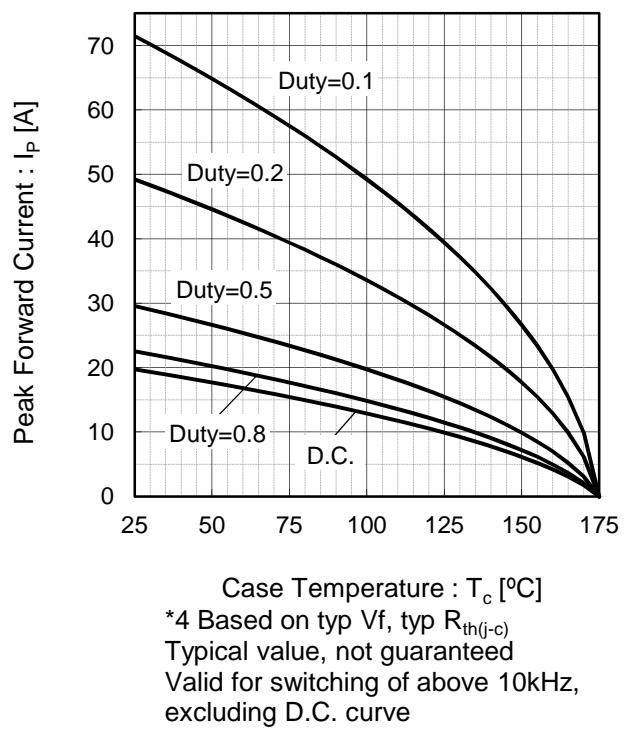


Fig.7*³ Maximum peak forward current derating curve I_P - T_c



Case Temperature : T_c [$^{\circ}\text{C}$]
*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)



Case Temperature : T_c [$^{\circ}\text{C}$]
*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)

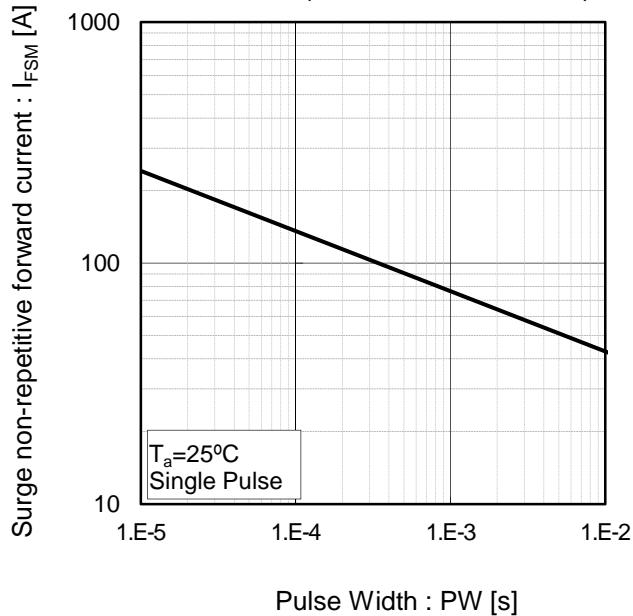
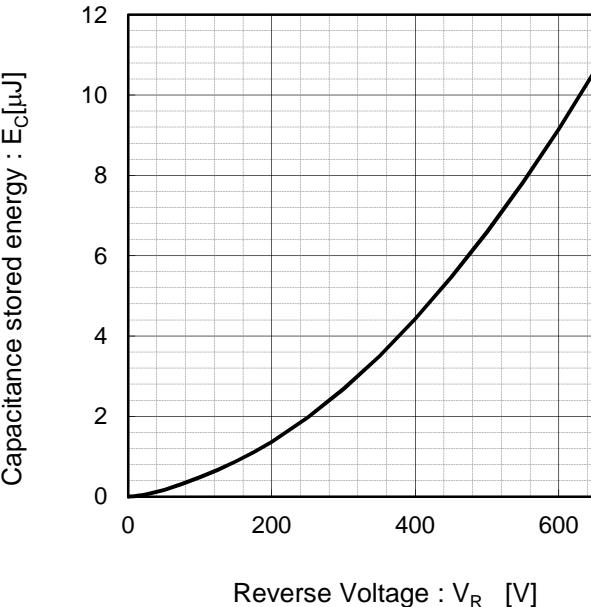
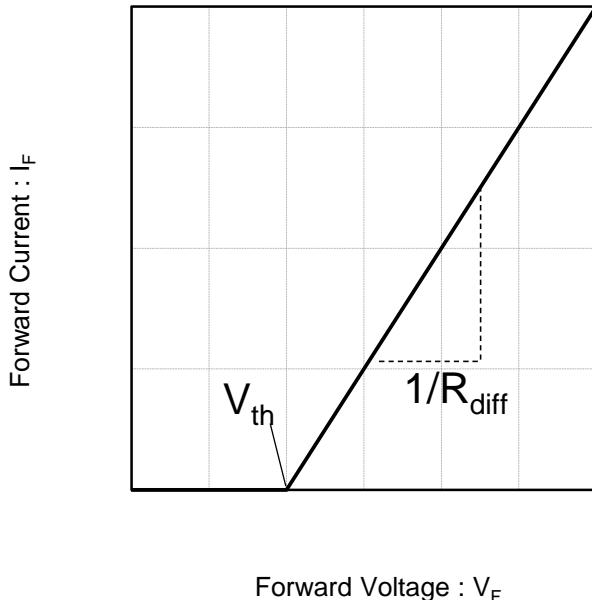


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

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	9.35E-01	V
a_1	-1.12E-03	V/°C
b_0	3.32E-02	Ω
b_1	8.50E-05	Ω/°C
b_2	9.00E-07	Ω/°C ²

T_j in °C; $-55^\circ\text{C} < T_j < 0^\circ\text{C}$; $I_F < 24\text{ A}$

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