SCS240AE2

SiC Schottky Barrier Diode

Datasheet

V_R	650V
I_F	20A/40A*
Q_C	31nC(Per leg)

(*Per leg/ Both legs)

● **Outline**

TO-247
TO-247N

(1) (2) (3)

● **Features**

1) Low forward voltage

2) Negligible recovery time/current

3) Temperature independent switching behavior

● **Inner circuit**

(1) Anode
(2) Cathode
(3) Anode

(1) (2) (3)

● **Applications**

・ Switch Mode Power Supply

・ Uninterruptible Power Supply

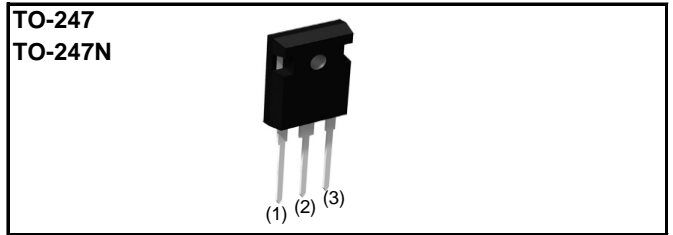・ Solar Inverter

・ Motor Drive

・ Air Conditioner

・ EV Charger

● **Packaging specifications**[1]

Package		TO-247	TO-247N
Type	Packing	Tube	
	Reel size (mm)	-	
	Tape width (mm)	-	
	Basic ordering unit (pcs)	30	
	Packing code	C	C11
	Marking	SCS240AE2	

● **Absolute maximum ratings** (T_j = 25°C)

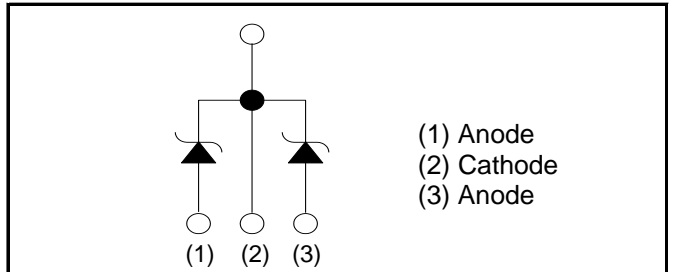| Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		V_{RM}	650	V
Reverse voltage (DC)		V_R	650	V
Continuous forward current [4] (T_c= 129°C)		I_F	20/40	A
Surge non-repetitive forward current [4]	PW=10ms sinusoidal, T_j=25°C	I_{FSM}	67/130	A
	PW=10ms sinusoidal, T_j=150°C		53/100	A
	PW=10μs square, T_j=25°C		260/520	A
Repetitive peak forward current [4]		I_{FRM}	81/160[2]	A
i^2t value [4]	PW=10ms, T_j=25°C	$\int i^2 dt$	22/91	A^2s
	PW=10ms, T_j=150°C		14/56	A^2s
Total power dissipation [4]		P_D	130/270[3]	W
Junction temperature		T_j	175	°C
Range of storage temperature		T_{stg}	−55 to +175	°C

[1] Tolerances of dimensions and packing specifications slightly differ between TO-247 and TO-247N, which is unlikely to influence compatibility for mounting. Please refer to corresponding specifications of dimensions for more details.

[2] T_c=100°C, T_j=150°C, Duty cycle=10%   [3] T_c=25°C   [4] Per leg/ Both legs

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●**Electrical characteristics** (T_j = 25°C) (Per Leg)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	I_R =4.0mA	650	-	-	V
Forward voltage	V_F	I_F=20A,T_j=25°C	-	1.35	1.55	V
		I_F=20A,T_j=150°C	-	1.55	-	V
		I_F=20A,T_j=175°C	-	1.63	-	V
Reverse current	I_R	V_R=600V,T_j=25°C	-	4	400	μA
		V_R=600V,T_j=150°C	-	60	-	μA
		V_R=600V,T_j=175°C	-	140	-	μA
Total capacitance	C	V_R=1V,f=1MHz	-	730	-	pF
		V_R=600V,f=1MHz	-	74	-	pF
Total capacitive charge	Q_C	V_R=400V,di/dt=350A/μs	-	31	-	nC
Switching time	t_C	V_R=400V,di/dt=350A/μs	-	19	-	ns

●**Thermal characteristics**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	Per Leg	-	0.92	1.1	°C/W
		Both Legs	-	0.46	0.55	°C/W

●**Typical Transient Thermal Characteristics (Per Leg)**

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	1.94×10^{-1}		C_{th1}	3.08×10^{-3}	
R_{th2}	7.23×10^{-1}	K/W	C_{th2}	8.36×10^{-3}	Ws/K
R_{th3}	5.52×10^{-3}		C_{th3}	1.03×10^{0}	
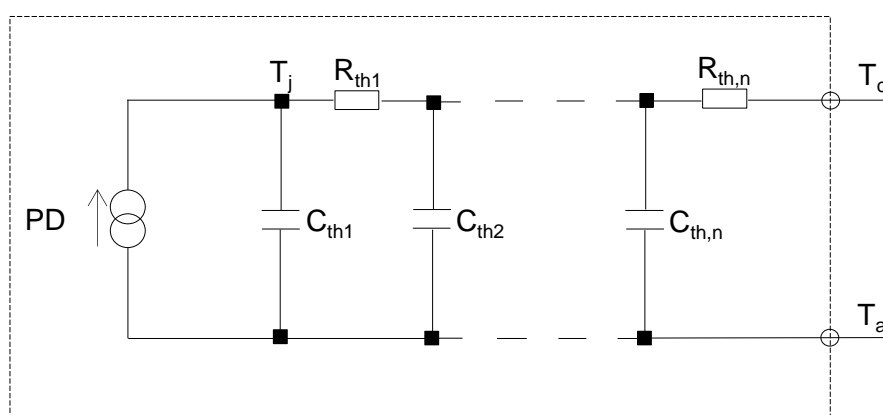
●**Electrical characteristic curves**
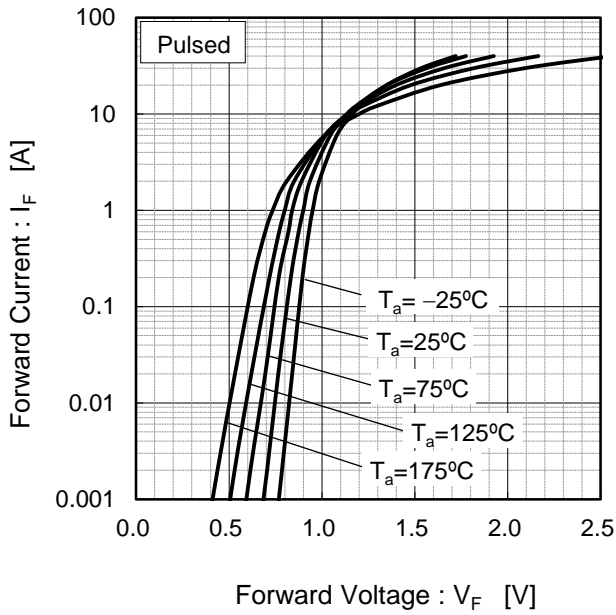
Fig.1 V_F - I_F Characteristics (Per Leg)

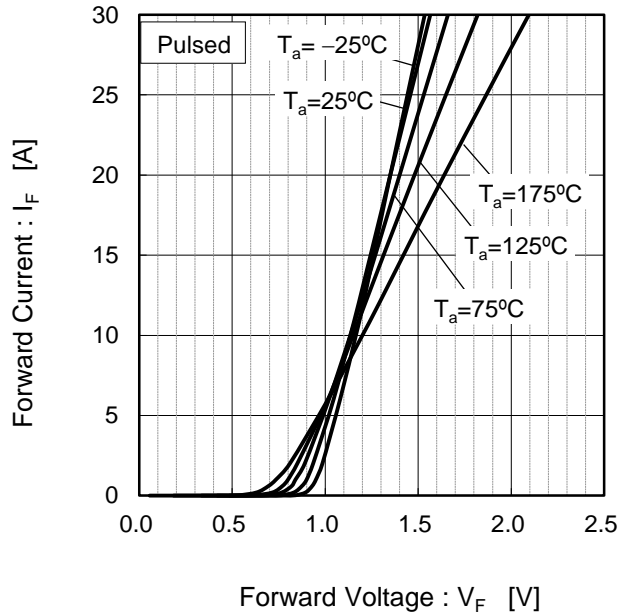Fig.2 V_F - I_F Characteristics (Per Leg)

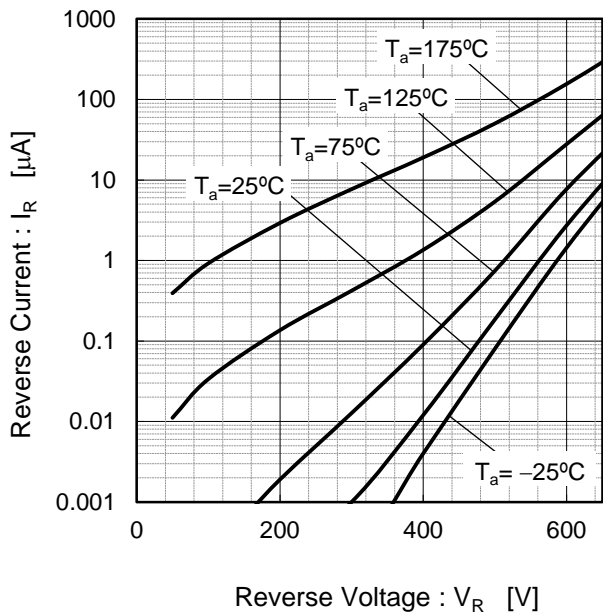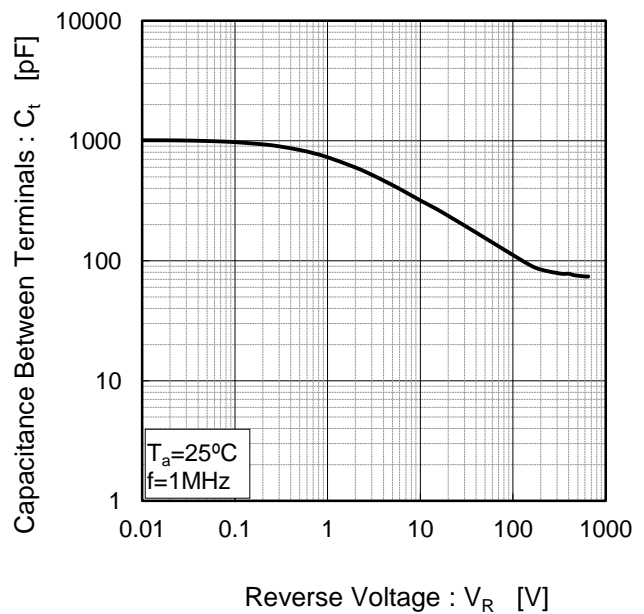Fig.3 V_R - I_R Characteristics (Per Leg)

Fig.4 V_R - C_t Characteristics (Per Leg)

● **Electrical characteristic curves**

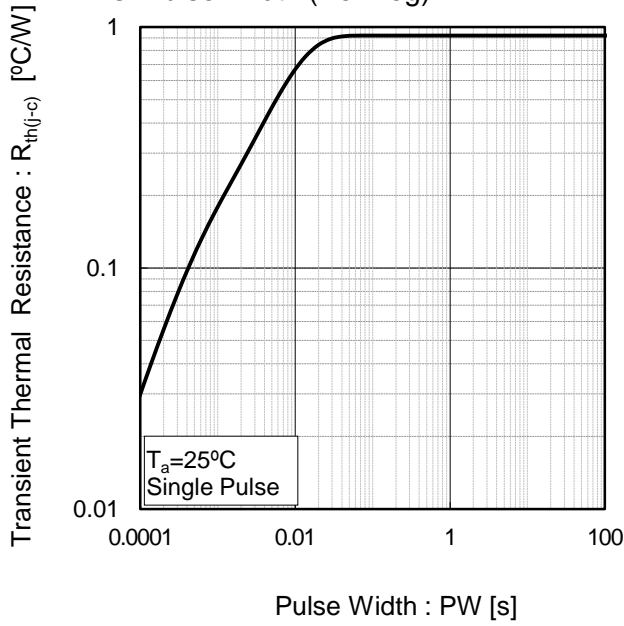Fig.5 Typical Transient Thermal Resistance vs. Pulse Width (Per Leg)
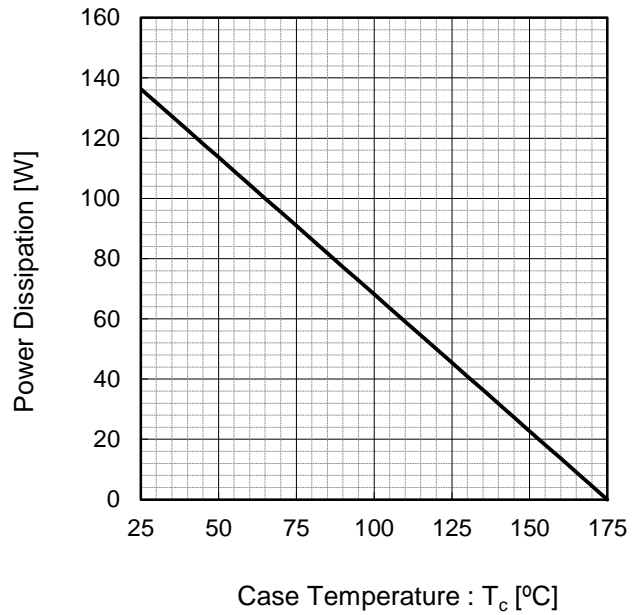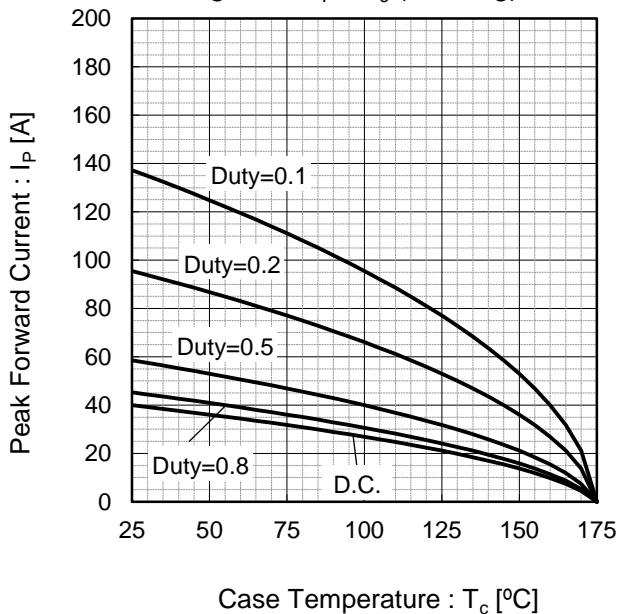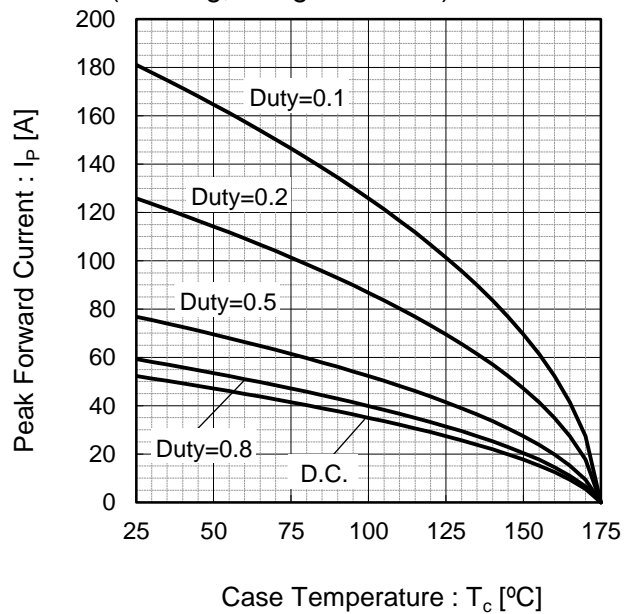

Fig.6 Power Dissipation (Per Leg)

Fig.7*5 Maximum peak forward current derating curve I_P - T_c (Per Leg)

Case Temperature : T_c [ºC]
*5 Based on max Vf, max $R_{th(j-c)}$
Valid for switching of above 10kHz, excluding D.C. curve.

Fig.8*6 Typical peak forward current derating curve I_P - T_c (Per Leg, Not guaranteed)

Case Temperature : T_c [ºC]
*6 Based on typ Vf, typ $R_{th(j-c)}$
Typical value, not guaranteed
Valid for switching of above 10kHz, excluding D.C. curve

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● **Electrical characteristic curves**

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

$T_a = 25°C$
Single Pulse
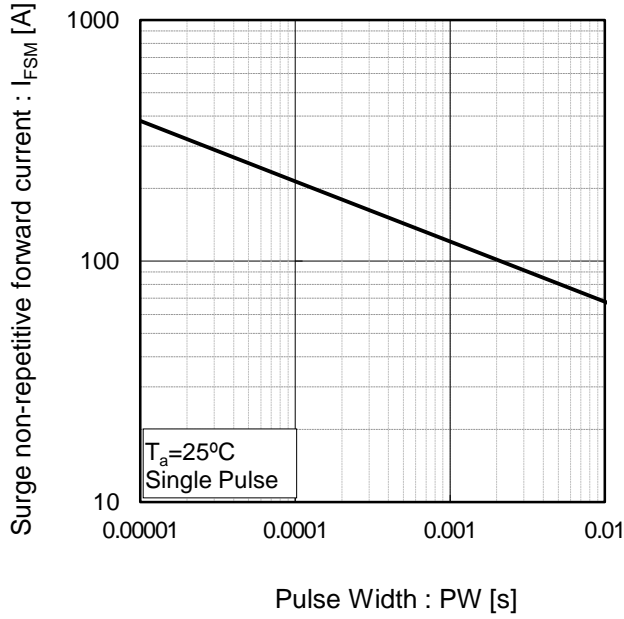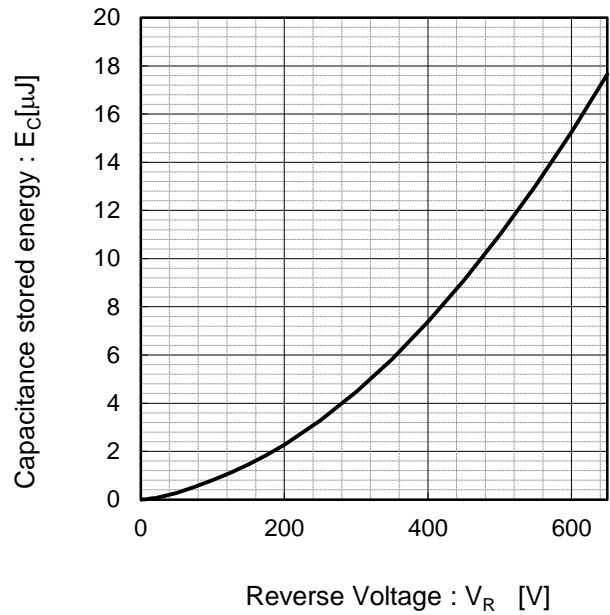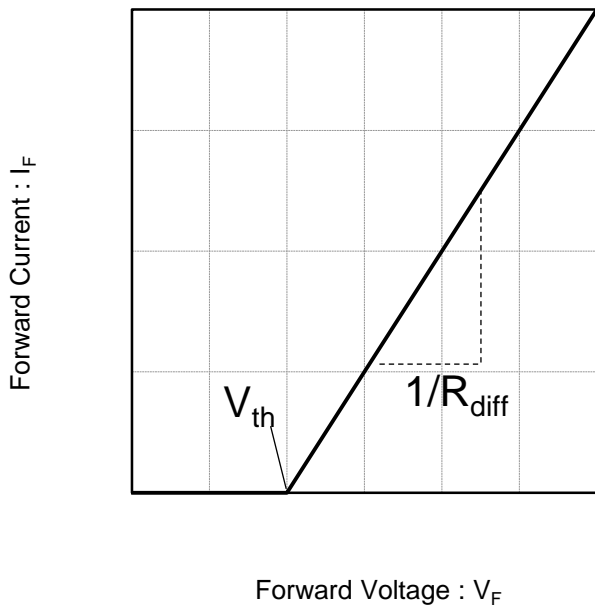
Pulse Width : PW [s]

Fig.10 Typical capacitance store energy (Per Leg)

Reverse Voltage : V_R [V]

● **Symplified forward characteristic model (Per Leg)**

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	9.35×10^{-1}	V
a_1	-1.12×10^{-3}	V/°C
b_0	1.99×10^{-2}	Ω
b_1	5.10×10^{-5}	Ω/°C
b_2	5.40×10^{-7}	Ω/°C^2

T_j in °C; -55 °C < T_j < 175°C ; I_F < 40 A

V_{th} $1/R_{diff}$

Forward Current : I_F

Forward Voltage : V_F

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