SCS230AE2

SiC Schottky Barrier Diode

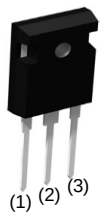
Datasheet

V_R	650V
I_F	15A/30A*
Q_C	23nC(Per leg)

(*Per leg/ Both legs)

●Outline

TO-247N



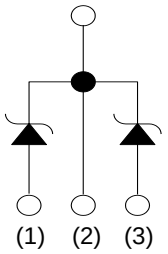
●Features

1) Low forward voltage

2) Negligible recovery time/current

3) Temperature independent switching behavior

●Inner circuit



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

●Applications

- Switch Mode Power Supply
- Uninterruptible Power Supply
- Solar Inverter
- Motor Drive
- Air Conditioner
- EV Charger

●Packaging specifications

Package		TO-247N
Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Packing code	C11
	Marking	SCS230AE2

●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 *3	(T_c= 134°C)	I_F	15/30	A
Surge non-repetitive forward current *3	PW=10ms sinusoidal, T_j=25°C	I_{FSM}	52/100	A
	PW=10ms sinusoidal, T_j=150°C		41/82	A
	PW=10μs square, T_j=25°C		200/400	A
Repetitive peak forward current *3		I_{FRM}	65/130 *1	A
i^2t value *3	PW=10ms, T_j=25°C	$\int i^2dt$	13/55	A^2s
	PW=10ms, T_j=150°C		8.4/33	A^2s
Total power dissipation *3		P_D	110/230 *2	W
Junction temperature		T_j	175	°C
Range of storage temperature		T_{stg}	−55 to +175	°C

*1 Tc=100°C, Tj=150°C, Duty cycle=10% *2 Tc=25°C *3 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 =3.0mA	650	-	-	V
Forward voltage	V_F	I_F=15A,T_j=25°C	-	1.35	1.55	V
		I_F=15A,T_j=150°C	-	1.55	-	V
		I_F=15A,T_j=175°C	-	1.63	-	V
Reverse current	I_R	V_R=600V,T_j=25°C	-	3	300	μA
		V_R=600V,T_j=150°C	-	45	-	μA
		V_R=600V,T_j=175°C	-	105	-	μA
Total capacitance	C	V_R=1V,f=1MHz	-	550	-	pF
		V_R=600V,f=1MHz	-	56	-	pF
Total capacitive charge	Q_C	V_R=400V,di/dt=350A/μs	-	23	-	nC
Switching time	t_C	V_R=400V,di/dt=350A/μs	-	18	-	ns

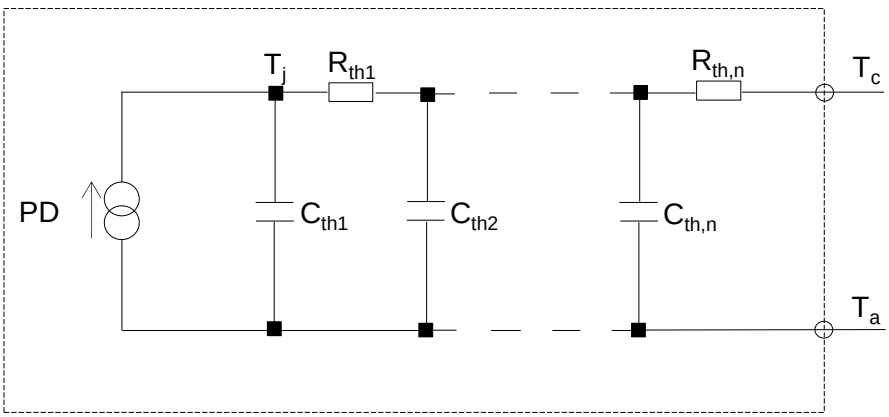
●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	Per Leg	-	1.1	1.3	°C/W
		Both Legs	-	0.55	0.63	°C/W

●Typical Transient Thermal Characteristics (Per Leg)

Symbol	Value	Unit
R_{th1}	2.90×10^{-1}	K/W
R_{th2}	8.03×10^{-1}	
R_{th3}	8.54×10^{-3}	

Symbol	Value	Unit
C_{th1}	2.33×10^{-3}	Ws/K
C_{th2}	8.15×10^{-3}	
C_{th3}	5.82×10^{-1}	



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●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics (Per Leg)

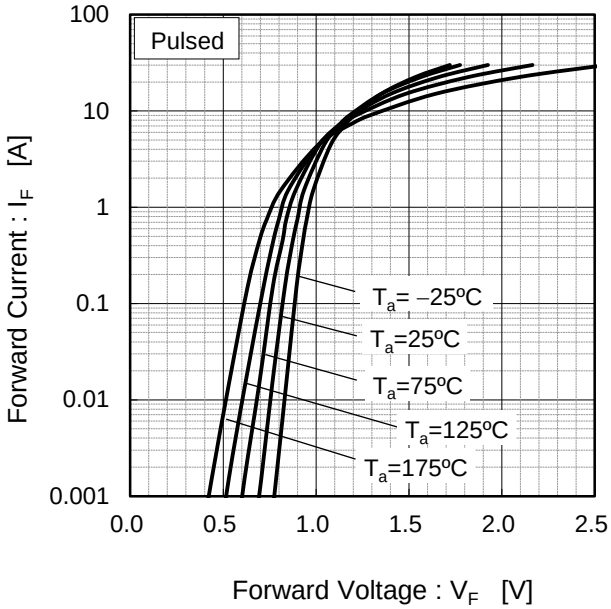


Fig.2 V_F - I_F Characteristics (Per Leg)

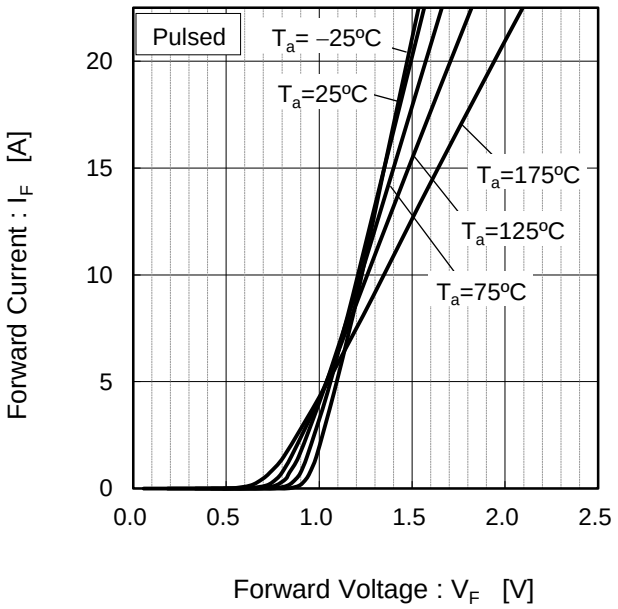


Fig.3 V_R - I_R Characteristics (Per Leg)

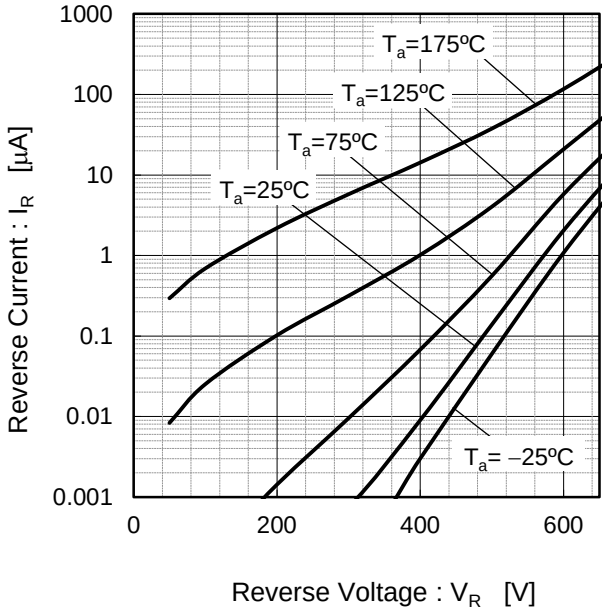
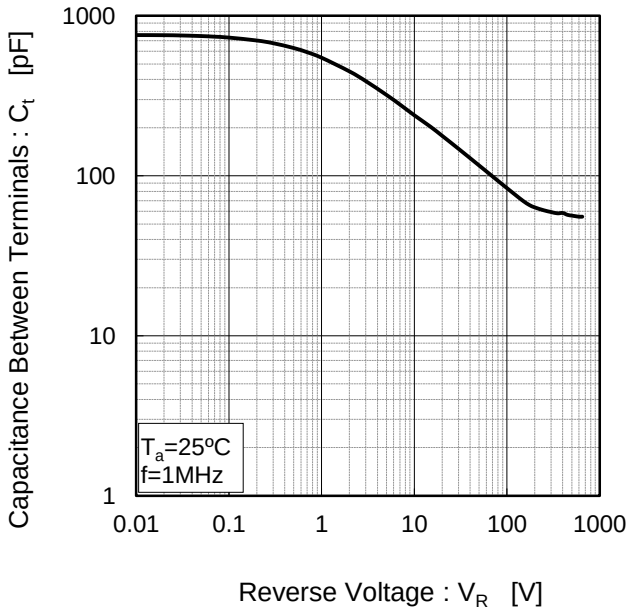


Fig.4 V_R - C_t Characteristics (Per Leg)



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●Electrical characteristic curves

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

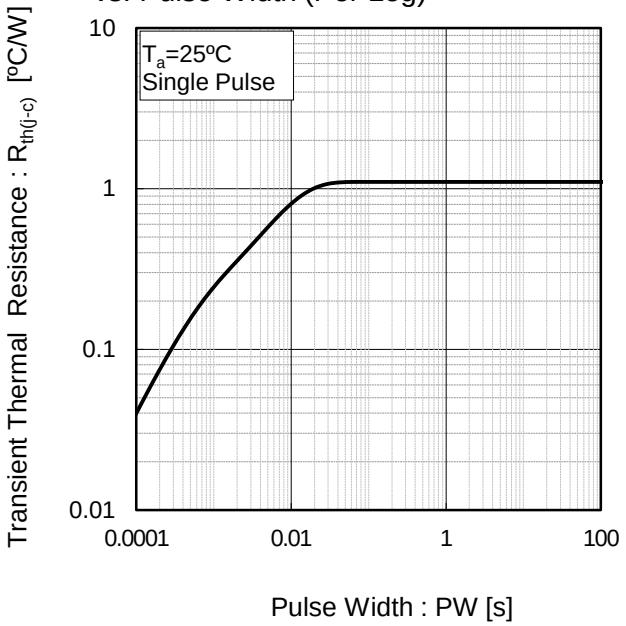


Fig.6 Power Dissipation (Per Leg)

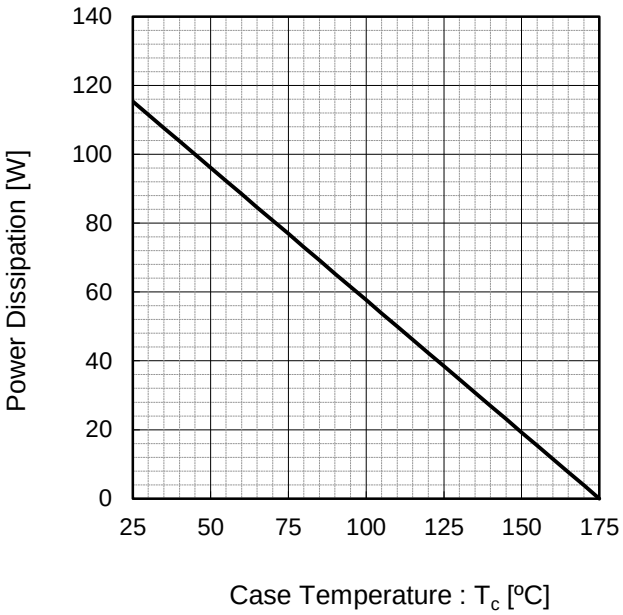
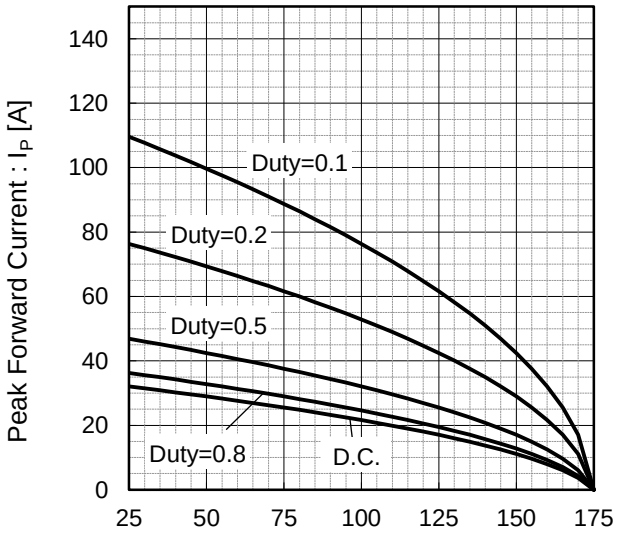
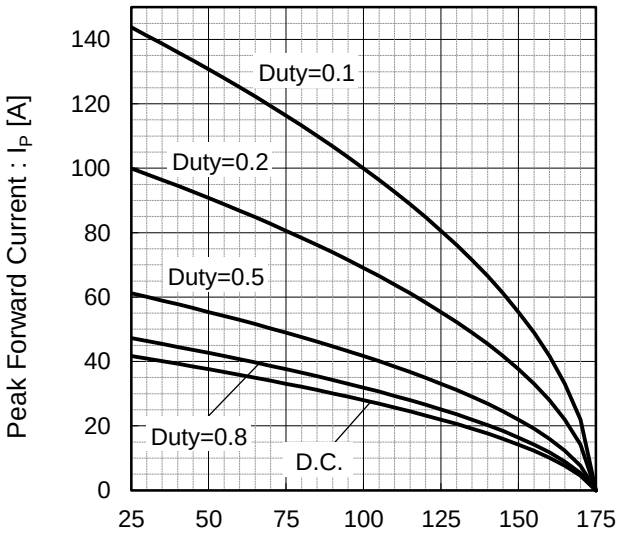


Fig.7*4 Maximum peak forward current derating curve I_P - T_c (Per Leg)



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

Fig.8*5 Typical peak forward current derating curve I_P - T_c (Per Leg, Not guaranteed)



*5 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)

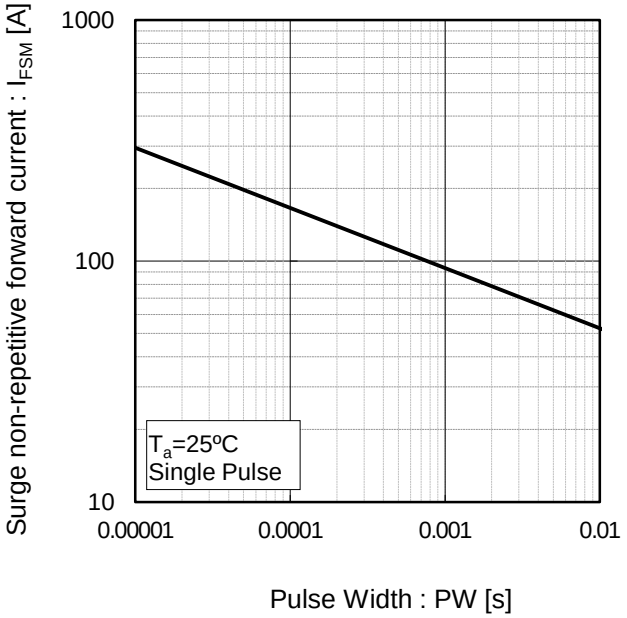
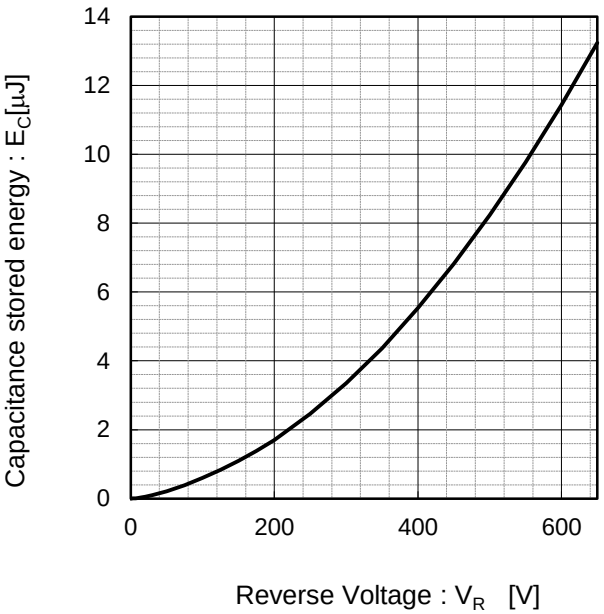
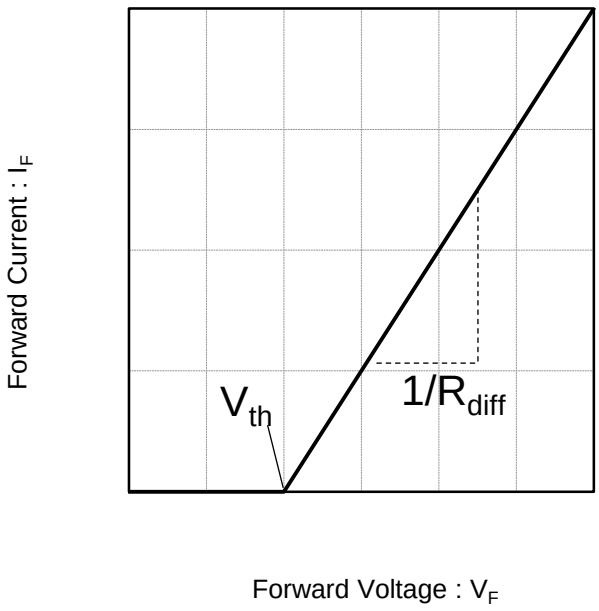


Fig.10 Typical capacitance store energy (Per Leg)



●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	2.65×10^{-2}	Ω
b_1	6.80×10^{-5}	Ω/°C
b_2	7.20×10^{-7}	Ω/°C^2

T_j in ºC; -55 ºC < T_j < 175ºC ; I_F < 30 A

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