SCS220KE2HR

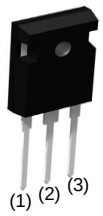
Automotive Grade SiC Schottky Barrier Diode Datasheet

V_R	1200V
I_F	10A/20A*
Q_C	34nC(Per leg)

(*Per leg/ Both legs)

●Outline

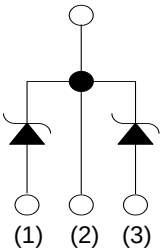
TO-247
TO-247N



●Features

1) AEC-Q101 qualified
2) Low forward voltage
3) Negligible recovery time/current
4) Temperature independent switching behavior

●Inner circuit



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

●Applications

- On Board Charger
- DC/DC Converter
- Wireless Charger
- 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	SCS220KE2	

●Absolute maximum ratings (T_j = 25°C)

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		V_{RM}	1200	V
Reverse voltage (DC)		V_R	1200	V
Continuous forward current *4	(T_c= 143°C)	I_F	10/20	A
Surge non-repetitive forward current*4	PW=10ms sinusoidal, T_j=25°C	I_{FSM}	42/84	A
	PW=10ms sinusoidal, T_j=150°C		31/62	A
	PW=10μs square, T_j=25°C		160/320	A
Repetitive peak forward current *4		I_{FRM}	47/94*2	A
i^2t value*4	PW=10ms, T_j=25°C	$\int i^2dt$	9/36	A^2s
	PW=10ms, T_j=150°C		4.8/19	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

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	I_R =0.2mA	1200	-	-	V
Forward voltage	V_F	I_F=10A,T_j=25°C	-	1.4	1.6	V
		I_F=10A,T_j=150°C	-	1.8	-	V
		I_F=10A,T_j=175°C	-	1.9	-	V
Reverse current	I_R	V_R=1200V,T_j=25°C	-	10	200	μA
		V_R=1200V,T_j=150°C	-	80	-	μA
		V_R=1200V,T_j=175°C	-	130	-	μA
Total capacitance	C	V_R=1V,f=1MHz	-	530	-	pF
		V_R=600V,f=1MHz	-	43	-	pF
Total capacitive charge	Q_C	V_R=800V,di/dt=500A/μs	-	34	-	nC
Switching time	t_C	V_R=800V,di/dt=500A/μs	-	15	-	ns

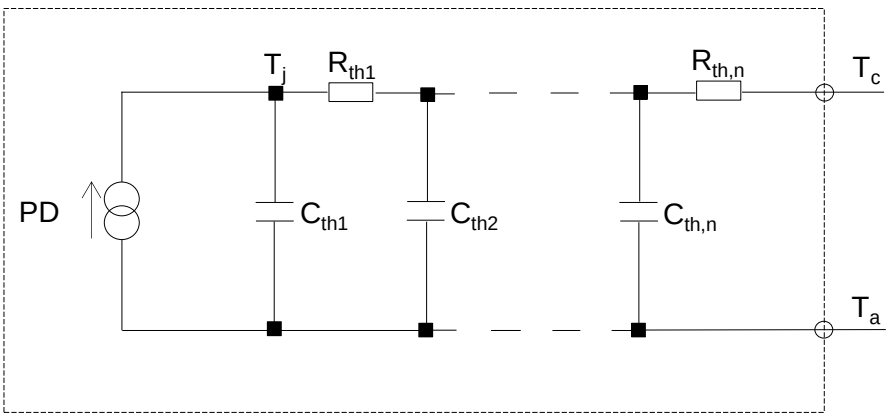
●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	Per Leg	-	0.9	1.1	°C/W
		Both Legs	-	0.45	0.55	°C/W

●Typical Transient Thermal Characteristics (Per Leg)

Symbol	Value	Unit
R_{th1}	2.88×10^{-1}	K/W
R_{th2}	5.59×10^{-1}	
R_{th3}	2.13×10^{-1}	

Symbol	Value	Unit
C_{th1}	3.30×10^{-3}	Ws/K
C_{th2}	1.03×10^{-2}	
C_{th3}	2.90×10^{-1}	



●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics (Per Leg)

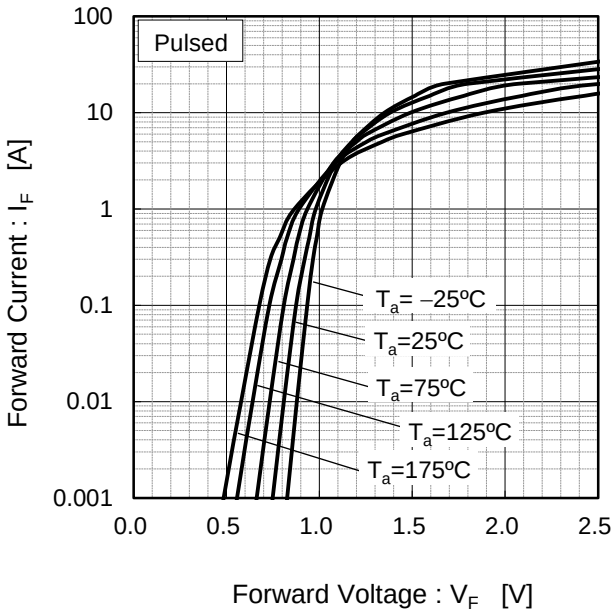


Fig.2 V_F - I_F Characteristics (Per Leg)

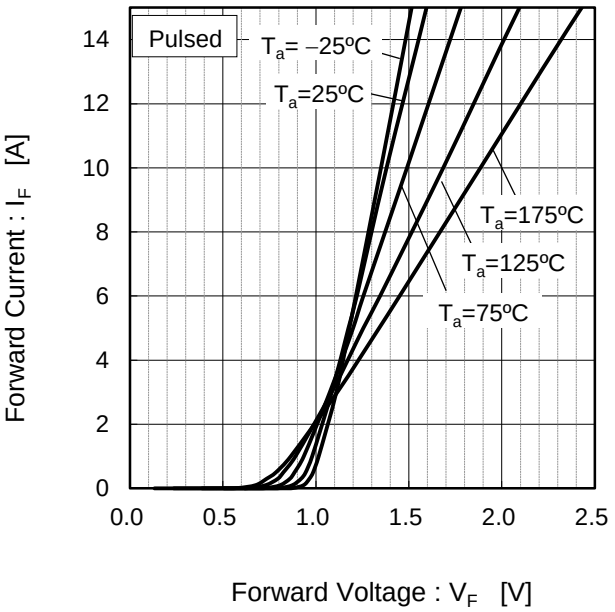


Fig.3 V_R - I_R Characteristics (Per Leg)

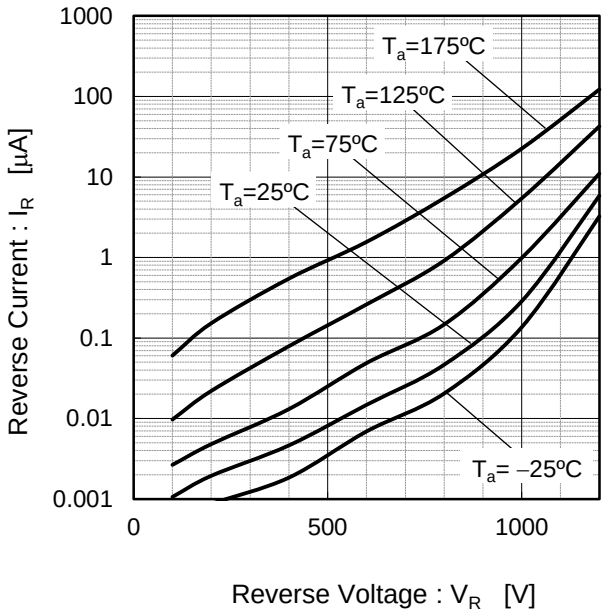
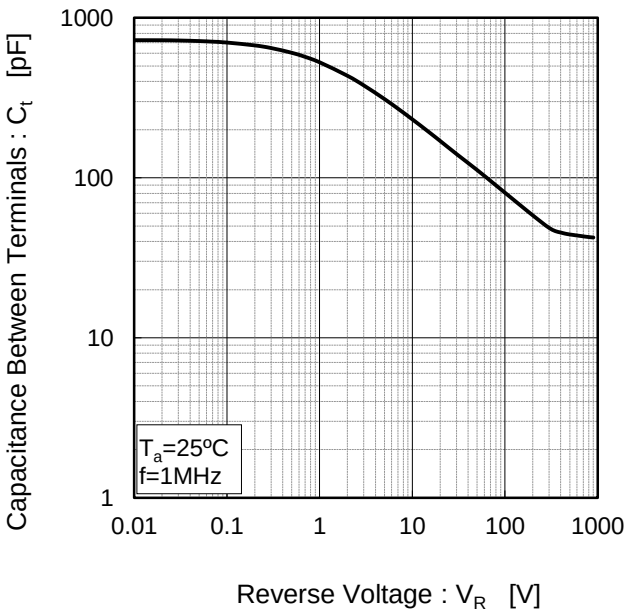


Fig.4 V_R - C_t Characteristics (Per Leg)



●Electrical characteristic curves

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

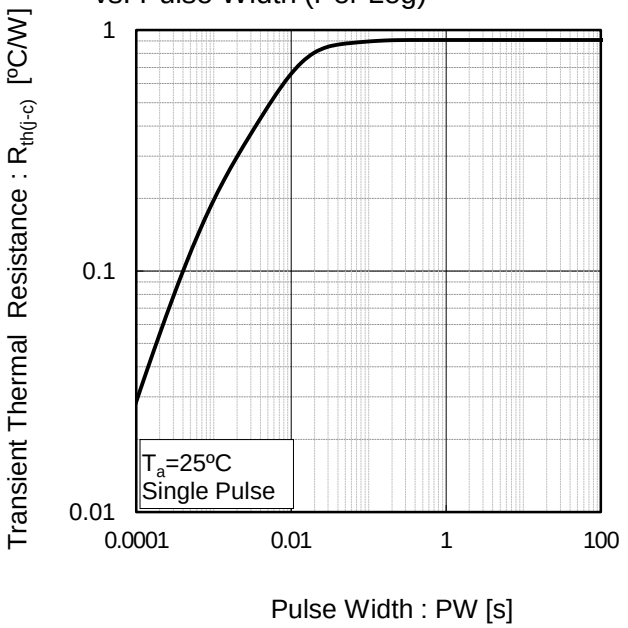


Fig.6 Power Dissipation (Per Leg)

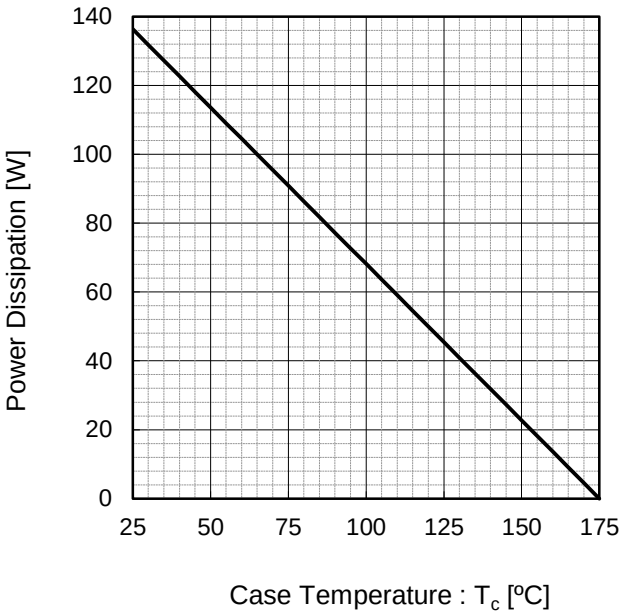
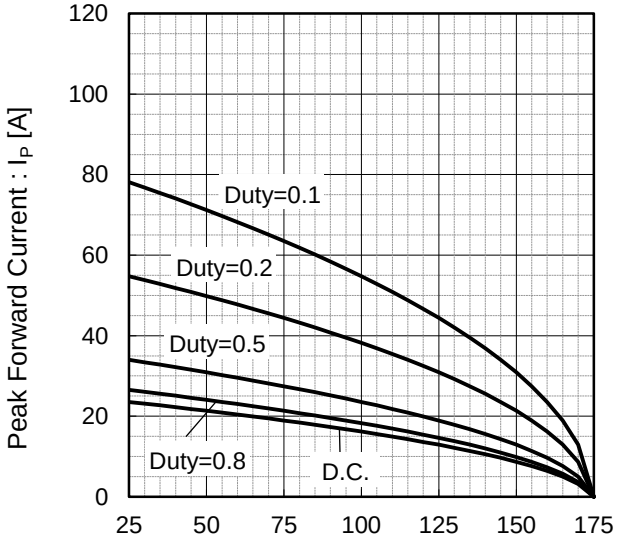
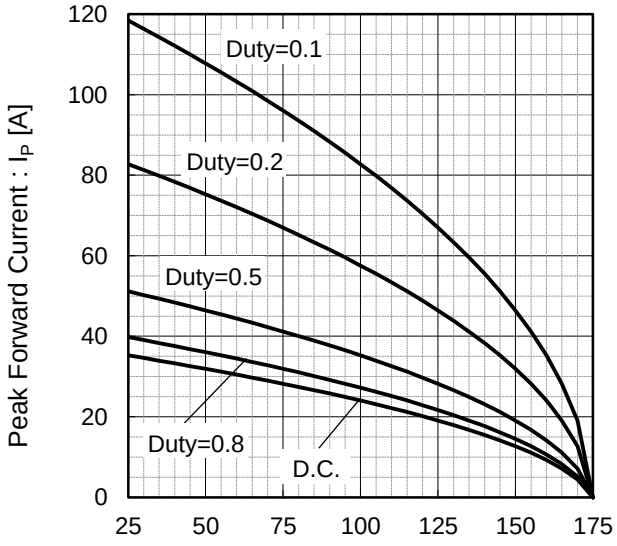


Fig.7*5 Maximum peak forward current derating curve I_P - T_c (Per Leg)



*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)



*6 Based on typ Vf, 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) (Per Leg)

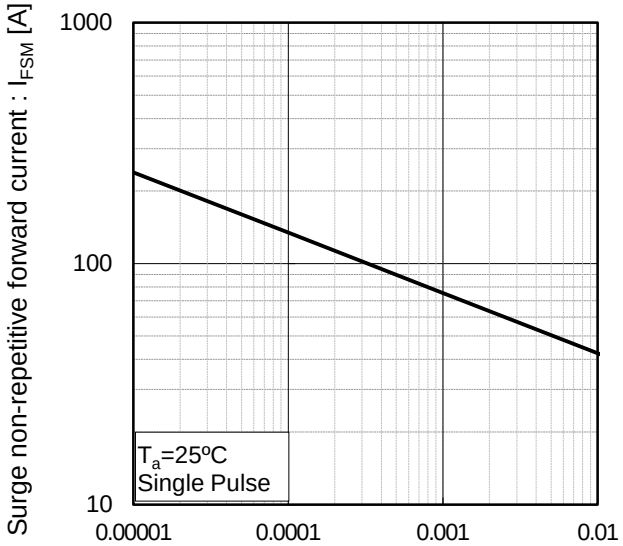
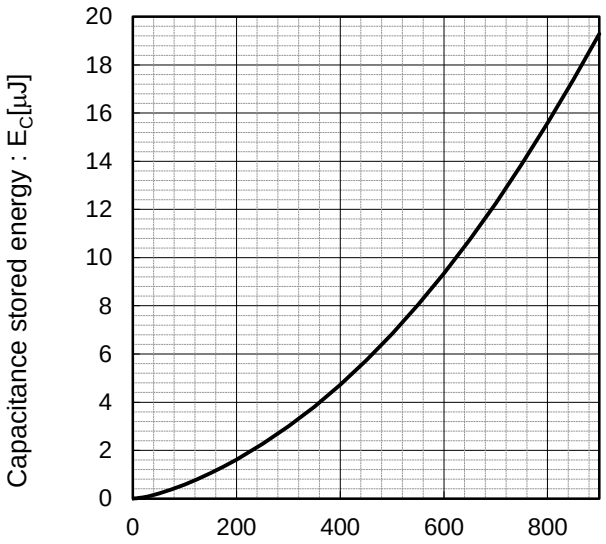
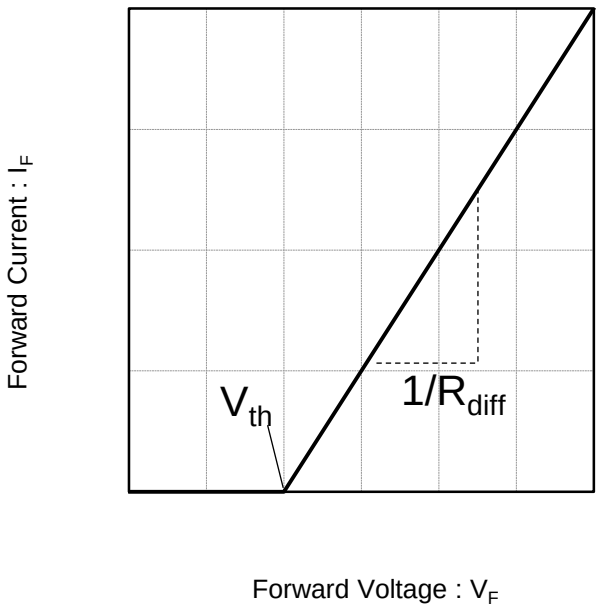


Fig.10 Typical capacitance store energy (Per Leg)



●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	9.93×10^{-1}	V
a_1	-1.27×10^{-3}	V/°C
b_0	3.65×10^{-2}	Ω
b_1	2.06×10^{-4}	Ω/°C
b_2	1.33×10^{-6}	Ω/°C^2

T_j in ºC; -55 ºC < T_j < 175ºC ; I_F < 20 A

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