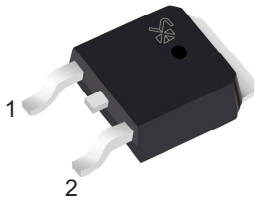
Silicon Carbide Schottky Barrier Diode

650V, 8A SiC SBD

General Description

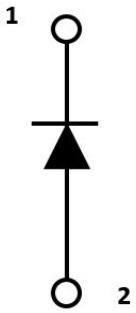
The Q-SSC0865 uses a completely new technology and designs to provide superior switching performances and higher reliability. This device is suitable for use in power factor correction (PFC), switch mode power supplies (SMPS) and general purpose applications.

Product Summary			TO-252
V_{RRM}	650	V	
I_F @ T_C=133°C	8	A	
Q_C @ VR=400V	34.2	nC	
E_C @ VR=400V	5.02	μJ	

Features

- Temperature independent switching behavior
- No reverse recovery current / No forward recovery
- Excellent thermal performances
- High surge current capability

Graphic Symbol



Applications

- Switch mode power supply
- Power factor correction
- Solar inverter
- Uninterruptible power supply

Maximum Ratings (T_A=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Repetitive Peak Reverse Voltage		V_{RRM}	650	V
Continuous Forward Current, D=1	T_C=25°C	I_F	19.5	A
	T_C=133°C		8	
Non-Repetitive Peak Forward Surge Current, Half Sine Wave, 10ms	T_C=25°C	$I_{F,SM}$	42	A
	T_C=150°C		35	
i^2t Value, 10ms		$\int i^2dt$	8.82	A
Non-Repetitive Peak Forward Current, 10us		$I_{F,max}$	252	A
Power Dissipation		P_D	56.3	W
Storage Temperature Range		T_{STG}	-55 to 150°C	°C
Operating Junction Temperature Range		T_J	-55 to 175°C	°C

Thermal Characteristics

Parameter	Symbol	Conditions	Min.	Typ	Max	Unit
Maximum Junction-to-Ambient [1]	R_{thJA}	TO-252	-	1.48	2.66	°C/W
Maximum Junction-to-Case [1]	R_{thJC}	TO-252	-	-	60	°C/W

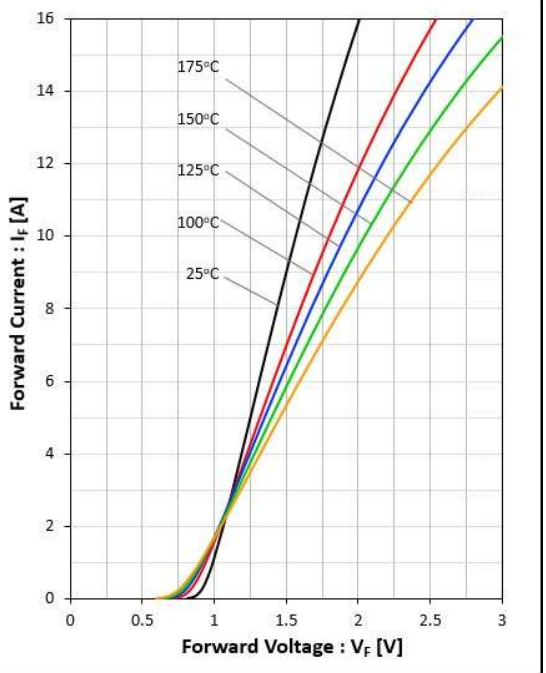
Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC CHARACTERISTICS						
DC Blocking Voltage	V_R	I_R=100uA, T_j=25°C	650	-	-	V
		I_R=100uA, T_j=175°C	650	-	-	
Forward Voltage	V_F	I_F=10A, T_j =25°C	-	1.4	1.7	V
		I_F=10A, T_j =150°C	-	1.8	2.2	
		I_F=10A, T_j=175°C	-	1.9	2.4	
Reverse Current	I_R	V_R=650V, T_j=25°C	-	1	45	μA
		V_R=650V, T_j=150°C	-	7	70	
		V_R=650V, T_j=175°C	-	15	150	
DYNAMIC CHARACTERISTICS						
Total Capacitive Charge	Q_C	V_R=400V, T_j=25°C $Q_C = \int_0^{V_R} C(V)dV$	-	24.5	-	nC
Total Capacitance	C	V_R=0.1V, f=1MHz, T_j=25°C	-	357	-	pF
		V_R=200V, f=1MHz, T_j=25°C	-	39.4	-	
		V_R=400V, f=1MHz, T_j=25°C	-	34.2	-	
Capacitance Stored Energy	E_C	V_R=400V, f=1MHz, T_j=25°C	-	5.02	-	μJ

Notes:
1. **Heat sink size: 25 x 17 x 4 cm^3**
2. **Pulse Test: Pulse Width ≦300μs, Duty Cycle≦ 2%.**
3. **The power dissipation is limited by 175°C junction temperature.**
4. **The data is theoretically the same as I_F and I_{FSM} in real applications, should be limited by total power dissipation.**

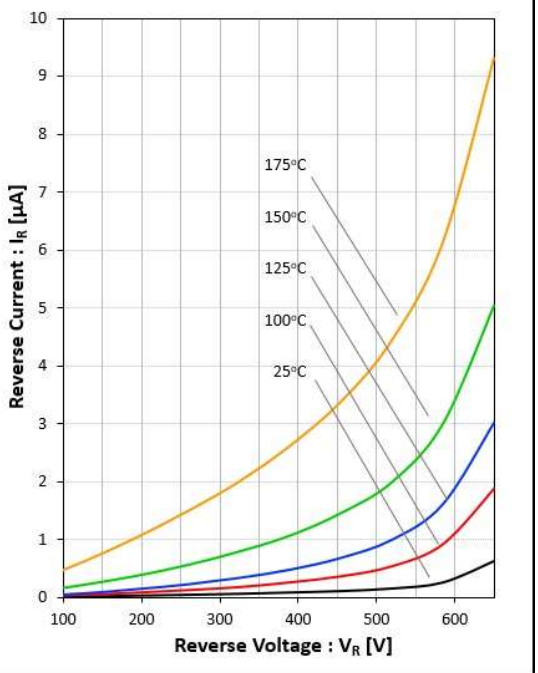
Typical Operating Characteristics

Figure 1: Typical Forward Characteristics



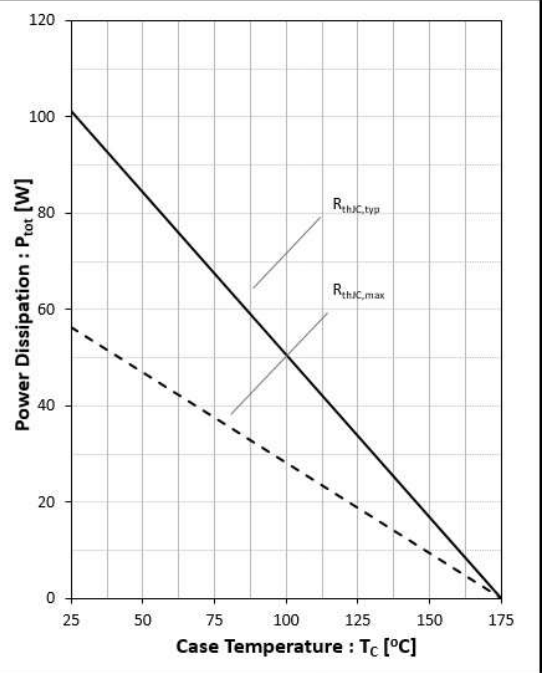
$I_F = f(V_F, T_j)$

Figure 2: Typical Reverse Characteristics



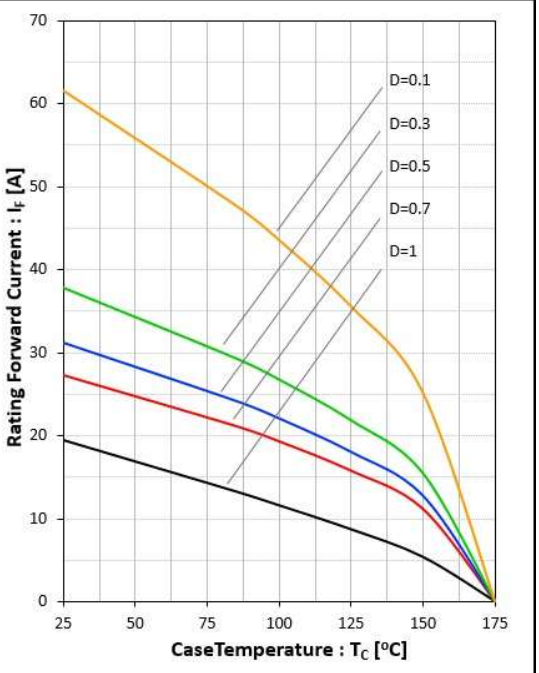
$I_R = f(V_R, T_j)$

Figure 3: Power Derating Curves



$P_{tot} = f(T_C)$; T_j=175°C

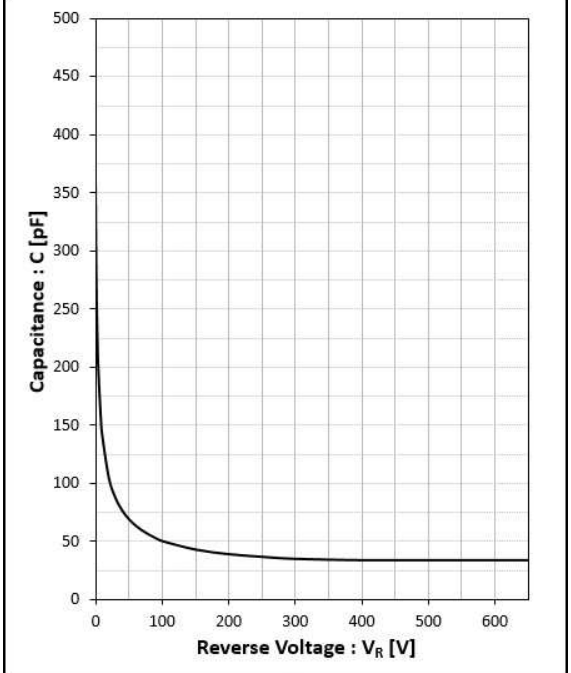
Figure 4: Current Derating Curves



$I_F = f(T_C)$; $R_{thJC,max}$; $V_{F,max}$; $T_j \leq 175°C$; $D=t_p/T$

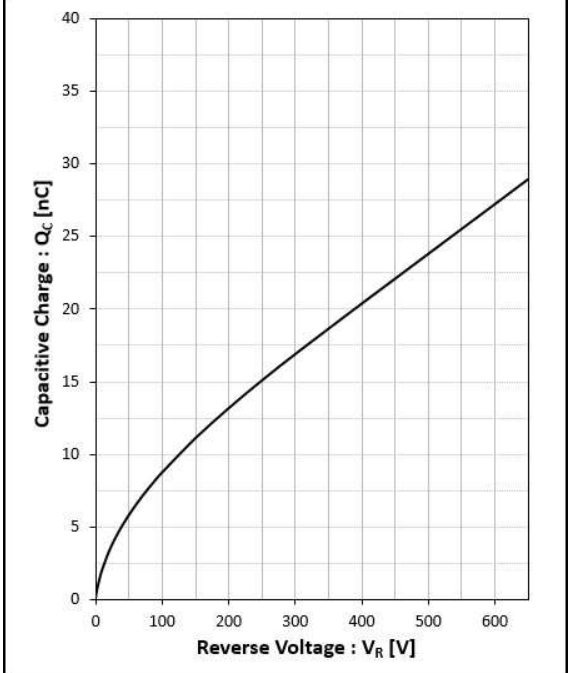
Typical Operating Characteristics (Cont.)

Figure 5: Typical Junction Capacitance



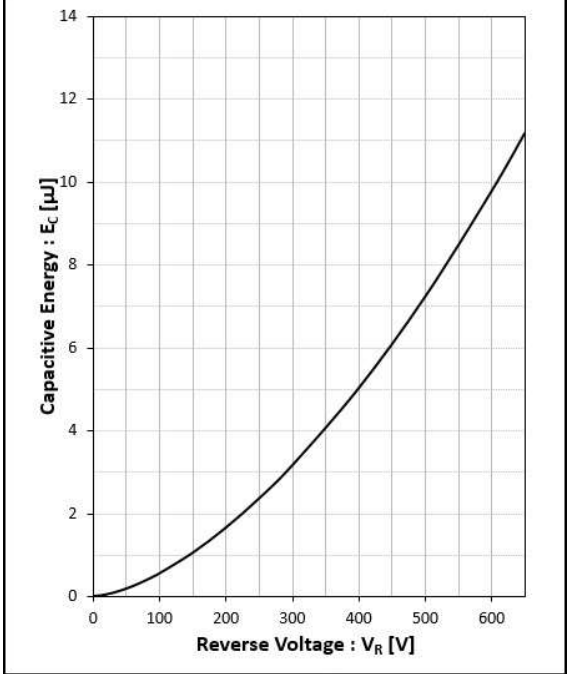
C = f(V_R); f=1MHz

Figure 6: Typical Capacitive Charge



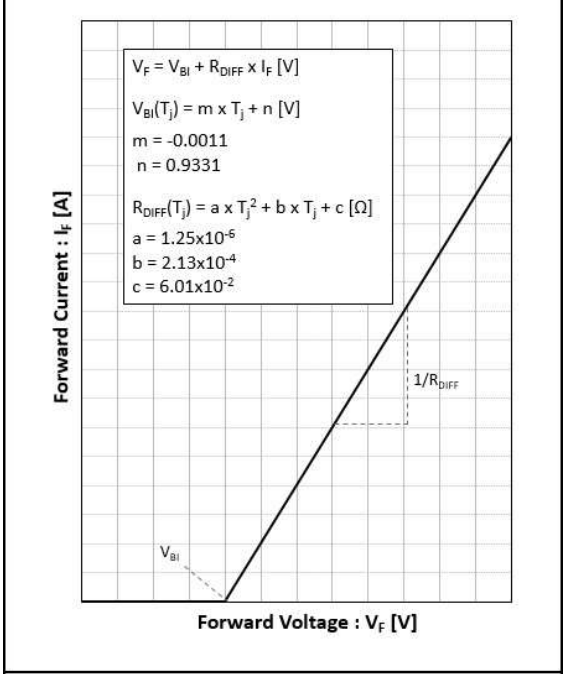
Q_C = f(V_R); f=1MHz

Figure 7: Typical Capacitive Energy



E_C = f(V_R); f=1MHz

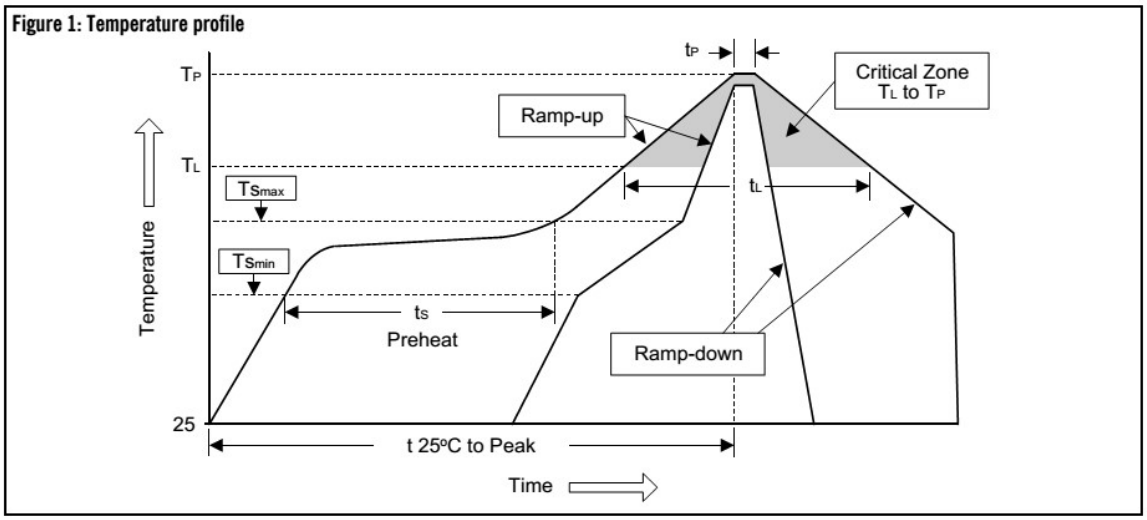
Figure 8: Forward Curve Model



I_F = f(V_F, T_j)

Soldering Methods for CW Product

1. Storage environment: Temperature=10˚C to35˚C Humidity=65%±15%
2. Reflow soldering of surface-mount devices



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60 to 120 sec	 150°C 200°C 60 to 180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60 to 150 sec	 217°C 60 to 150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec