QS800SGL330A3S: 3300V/800A IGBT Power Module

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Features

- Low VCE(sat) SPT IGBT technology
- Low switching losses
- 10µs short circuit capability
- VCE(sat) with positive temperature coefficient
- AlSiC baseplate for high power cycling capability
- AlN substrate for low thermal resistance
- High reliability package

Applications

- High Power Converter
- Wind Power
- Traction Drive

Key Values

PARAMETER	VALUE
VOLTAGE (COLLECTOR EMITTER)	3300V
CURRENT	800A

Part Number

QS800SGL330A3S

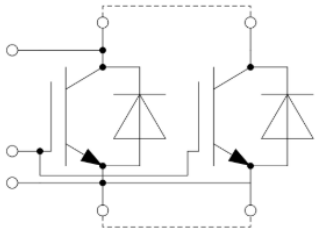
Package

Plastic package

Marking

Q

Package



ROHS Compliant
REACH Compliant

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ABSOLUTE MAXIMUM RATINGS (Ta = 25°C Unless otherwise specified)

IGBT

Parameter	*Symbol*	*Value*	*Unit*
Collector Emitter Voltage	V_{CES}	3300	V
Gate − Emitter Voltage	V_{GES}	± 20	V
Collector Current $T_c = 25$℃ **$T_c = 100$℃**	I_C	1500 800	A
Pulsed Collector Current $t_p = 1ms$	I_{CM}	1600	A
Maximum Power Dissipation@$T_J = 150$℃	P_D	9.62	kW

Diode

Parameter	*Symbol*	*Value*	*Unit*
Repetitive Peak Reverse Voltage	V_{RRM}	3300	V
Diode Continuous Forward Current	I_F	800	A
Diode Maximum *Forward Current* $t_p = 1ms$	I_{FM}	1600	A

Module

Parameter	*Symbol*	*Value*	*Unit*
Maximum Junction Temperature	T_{jmax}	150	℃
Operating Junction Temperature	T_{jop}	$-40\ to$ $+\ 125$	℃
Storage Temperature Range	T_{STG}	$-40\ to$ $+\ 125$	℃
Isolation Voltage RMS, f = 50Hz, t = 1min	V_{ISO}	6000	V
Partial Discharge Extinction Voltage IEC1287, RMS, f = 50Hz, $Q_{PD} \leq 10pC$	V_{ISO}	2600	V

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IGBT Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 800A, V_{GE} = 15V, T_J = 25℃$		3.10	3.40	V
		$I_C = 800A, V_{GE} = 15V, T_J = 125℃$		3.80		
$V_{GE(th)}$	Gate Emitter Threshold Voltage	$I_C = 160mA, V_{GE} = V_{CE}, T_J = 25℃$	5.5		7.5	V
I_{CES}	Collector Cut − Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V, T_J = 25℃$			12.0	mA
I_{GES}	Gate − Emitter Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V, T_J = 25℃$			500	nA
C_{ies}	Input Capacitance	$V_{GE} = 25V, f = 1MHz, V_{GE} = 0V$		125		nF
C_{res}	Reverse Transfer Capacitance			1.48		nF
Q_G	Gate Charge	$V_{GE} = 1800V$ $V_{GE} = -15V\ to + 15V$		8.07		μC
$t_{d(on)}$	Turn − On Delay time	$V_{CC} = 1800V$ $I_C = 800A$ $R_G = 2.2Ω$ $V_{GE} = \pm 15V$ $T_J = 25℃$		525		ns
t_r	Rise time			190		
$t_{d(off)}$	Turn − off Delay time			1050		
t_f	fall time			340		
E_{on}	Turn − on switching loss			1000		mJ
E_{off}	Turn − off switching loss			880		
$t_{d(on)}$	Turn − On Delay time	$V_{CC} = 1800V$ $I_C = 800A$ $R_G = 1.2Ω$ $V_{GE} = \pm 15V$ $T_J = 125℃$		530		ns
t_r	Rise time			200		
$t_{d(off)}$	Turn − off Delay time			1200		
t_f	fall time			460		
E_{on}	Turn − on switching loss			1380		mJ
E_{off}	Turn − off switching loss			1250		
I_{sc}	SC Data	$t_p \leq 10\mu s, V_{GE} = 15V, T_J = 125℃, V_{CC} = 2500V, V_{CEM} \leq 3300V$		3300		A

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Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_F	Diode Forward Voltage	$I_F = 800A$, $V_{GE} = 0V$ $T_j = 25℃$		2.30	2.60	V
		$I_F = 800A$, $V_{GE} = 0V$ $T_j = 125℃$		2.35		
Q_r	Recovered Charge	$V_R = 1800V$ $I_F = 800A$ $-\frac{di}{dt} = 4200A/\mu s$ $V_{GE} = -15V$ $T_j = 25℃$		710		μC
I_{RM}	Peak Reverse Recovery Current			500		A
E_{rec}	Reverse Recovery Energy			620		mJ
Q_r	Recovered Charge	$V_R = 1800V$ $I_F = 800A$ $-\frac{di}{dt} = 4200A/\mu s$ $V_{GE} = -15V$ $T_j = 125℃$		950		μC
I_{RM}	Peak Reverse Recovery Charge			925		A
E_{rec}	Reverse Recovery Energy			1180		mJ

Module Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
L_{CE}	Stray Inductance		20		nH
$\boldsymbol{R_{CC'+R\_\theta JC}}$	Module Lead Resistance, Terminal to Chip		0.18		$m\Omega$
$R_{\theta JC}$	Junction to Case (per IGBT) Junction to Case (per Diode)			13.0 25.0	K/kW
$\boldsymbol{R_{\theta CS}}$	$Case - to - Sink$(per IGBT) $Case - to - Sink$(per Diode)		12.2 23.4		K/kW
$\boldsymbol{R_{\theta CS}}$	$Case - to - Sink$		8.0		K/kW
M	Terminal Connection Torque, Screw M4 Terminal Connection Torque, Screw M8 Mounting Torque, Screw M6	1.8 8.0 4.25		2.1 10 5.75	Nm
G	Weight of Module		1050		g

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Figure 1: IGBT Output Characteristics

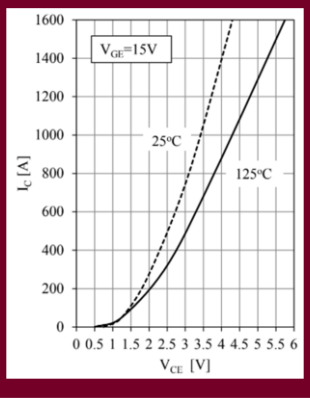

Figure 2: IGBT

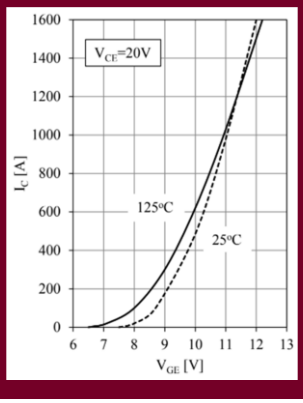

Figure 3: IGBT Switching Loss vs Ic

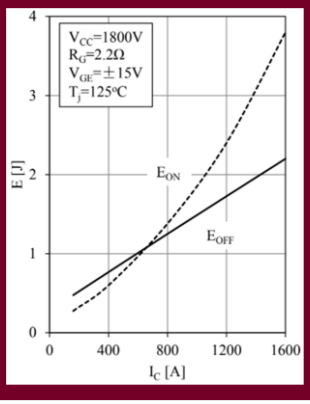

Figure 4: IGBT Switching Loss vs Rg

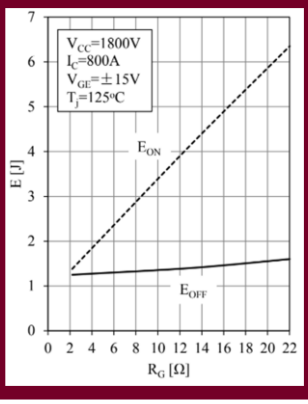

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Figure 5: RBSOA

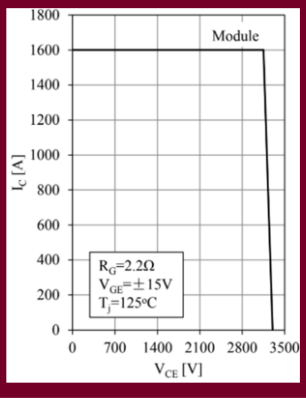


Figure 6: IGBT Transient Thermal Impedance

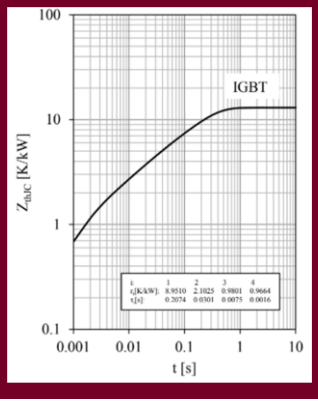


Figure 7: Diode Forward Characteristics

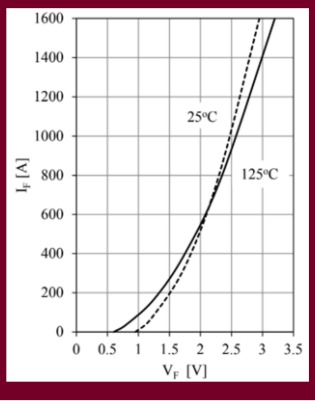


Figure 8: IGBT Switching Loss vs IF

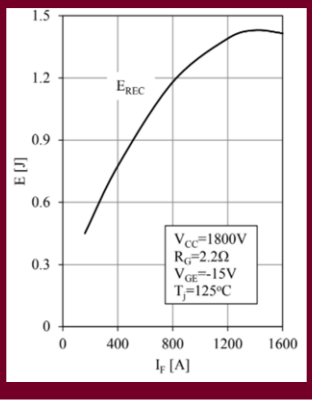


Figure 9: Diode switching loss vs RG

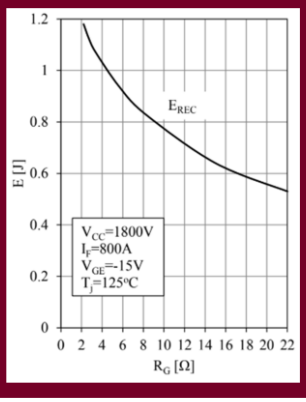
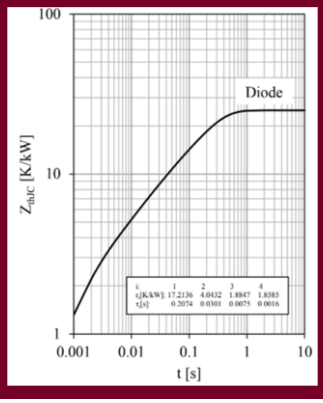


Figure 10: Diode transient thermal impedance



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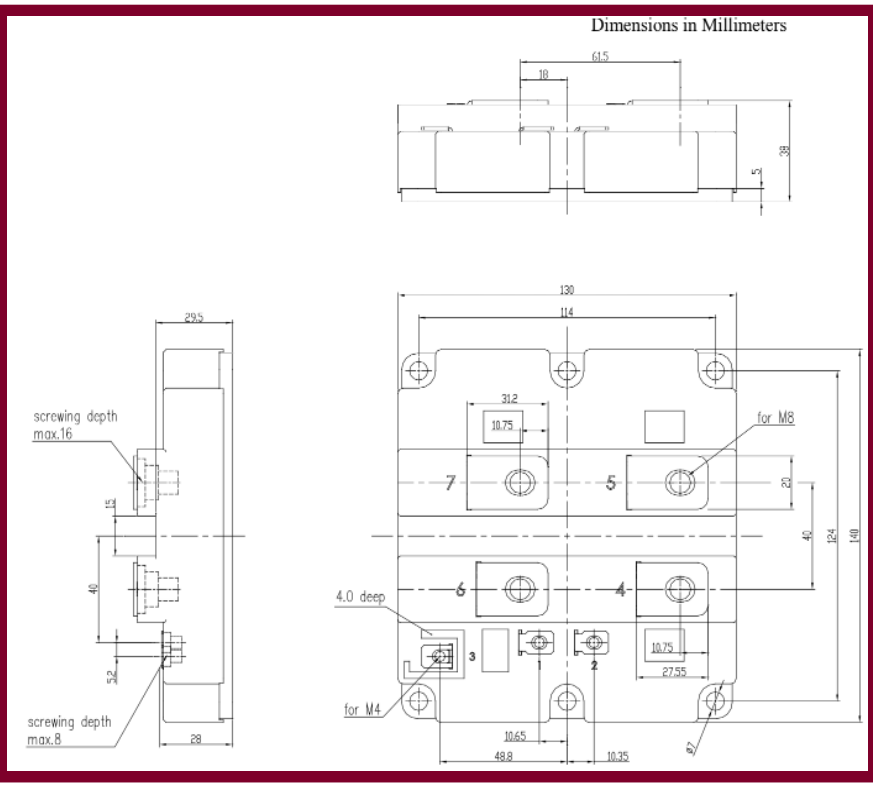

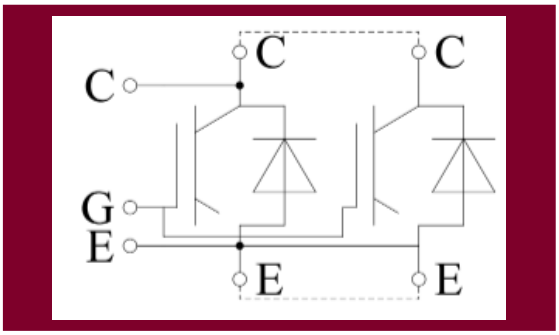

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