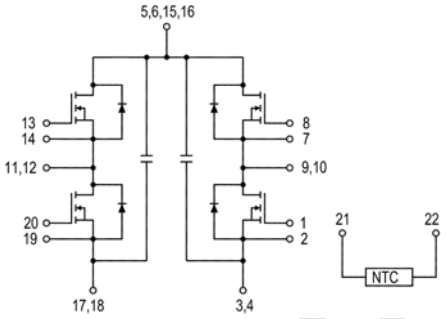
1200V 80mohm SiC MOSFETs Full Bridge

Flow 0 Compatible Package



Features

- Ultra Low Loss with SiC MOSFETs
- Zero Reverse Recovery Current with SiC SBDs
- Zero Turn-off Tail Current
- High-Frequency Operation
- Positive Temperature Coefficient on VDS(on)
- Al_2O_3 DBC substrate without Cu baseplate

Applications

- Vehicle Charger
- Fast DC/DC Converter

Benefits

- Outstanding performance at high frequency operation
- Low switching losses
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of R_{DS_ON}
- RoHS Compliant

Absolute Maximum Ratings (T_j=25^{o}C unless otherwise specified)

Parameters	Symbol	Conditions	Specifications	Units
Drain - Source Voltage	V_{DS}		1200	V
Continuous Drain Current (Q1-Q4)	I_D	V_{GS}=20V, T_C = 25 ^{0}C	40	A
		V_{GS}=20V, T_C = 80 ^{0}C	20	A
Gate - Source Voltage	V_{GS}		+25/-10	V
Pulsed Drain Current	I_{DS}	Limited by Tj_max	60	A
Maximum Power Dissipation	P_D	T_C = 25 ^{0}C	220	W
		T_C = 100 ^{0}C	TBD	W
Operating Junction Temperature	T_j		-40 ~ 150	^{0}C
Storage Temperature	T_{STG}		-40 ~ 125	^{0}C
Solder Temperature	T_L	Max for 10 sec	260	^{0}C

Electrical Characteristics of MOSFETs (Q1~Q4) (T_j=25°C unless otherwise specified)

Parameters	Symbol	Conditions	Min	Typ	Max	Units
OFF						
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200V, V_{GS} = 0V	--	1	100	uA
Gate-Source Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = 20V	--	--	±250	nA
ON						
Gate-Source Threshold Voltage	$V_{GS(TH)}$	V_{DS} = 10V, I_D = 1mA	1.7	2.2	--	V
On State Resistance	$R_{DS(ON)}$	V_{GS} = 20V, I_D = 20A, T_j = 25 °C	--	80	--	mΩ
		V_{GS} = 20V, I_D = 20A, T_j = 150 °C	--	150	--	mΩ
DYNAMIC						
Input Capacitance	C_{ISS}	V_{DS} = 800V, V_{GE} = 0V, f = 1 MHz	--	950	--	pF
Output Capacitance	C_{OSS}		--	80	--	pF
Reverse Transfer Capacitance	C_{RSS}		--	6.5	--	pF
Module Stray Inductance	L_{σ}		--	TBD	--	nH
Module Lead Resistance	R_{mod}		--	TBD	--	mΩ
SWITCHING						
Turn-On Delay Time	$t_{d(on)}$	V_{DD}= 800V, I_D =20A R_G= 2.5Ω, V_{GS}= -5/20V Inductive Load, T_J=25 °C	--	15	--	ns
Rise Time	t_r		--	35	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	32	--	ns
Fall Time	t_f		--	26	--	ns
Turn-On Switching Energy Loss	E_{ON}		--	0.4	--	mJ
Turn-Off Switching Energy Loss	E_{OFF}		--	0.25	--	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{DD}= 800V, I_D =20A R_G= 2.5Ω, V_{GS}=-5/20V Inductive Load, T_J=125 °C	--	TBD	--	ns
Rise Time	t_r		--	TBD	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	TBD	--	ns
Fall Time	t_f		--	TBD	--	ns
Turn-On Switching Energy Loss	E_{ON}		--	TBD	--	mJ
Turn-Off Switching Energy Loss	E_{OFF}		--	TBD	--	mJ
Total Gate Charge	Q_G	V_{DD}= 800V, I_D =20A V_{GS}= -5/20V	--	49.2	--	nC
Gate-Source Charge	Q_{GS}		--	10.8	--	nC
Gate-Drain Charge	Q_{GD}		--	18	--	nC
Short Circuit Withstanding Time	t_{sc}	V_{CC}= 800V, V_{GS}= 20V T_J=125 °C	10	--	--	μs
BODY DIODE CHRACTERISTICS						

Max continuous drain-source diode forward current	I_S			20		A
Max pulsed drain-source diode forward current	I_{SM}			TBD		A
Diode forward voltage	V_{SD}	V_{GS}=-5V, I_{SD}=10A		3.3		V
Reverse recovery time	t_{rr}	V_{GS}=-5V, I_{SD}=20A, T_j=25°C, V_R=800V, dI_r/dt=1000A/us		40		ns
Reverse recovery charge	Q_{rr}			165		nC
Peak reverse recovery current	I_{rrm}			6.4		A

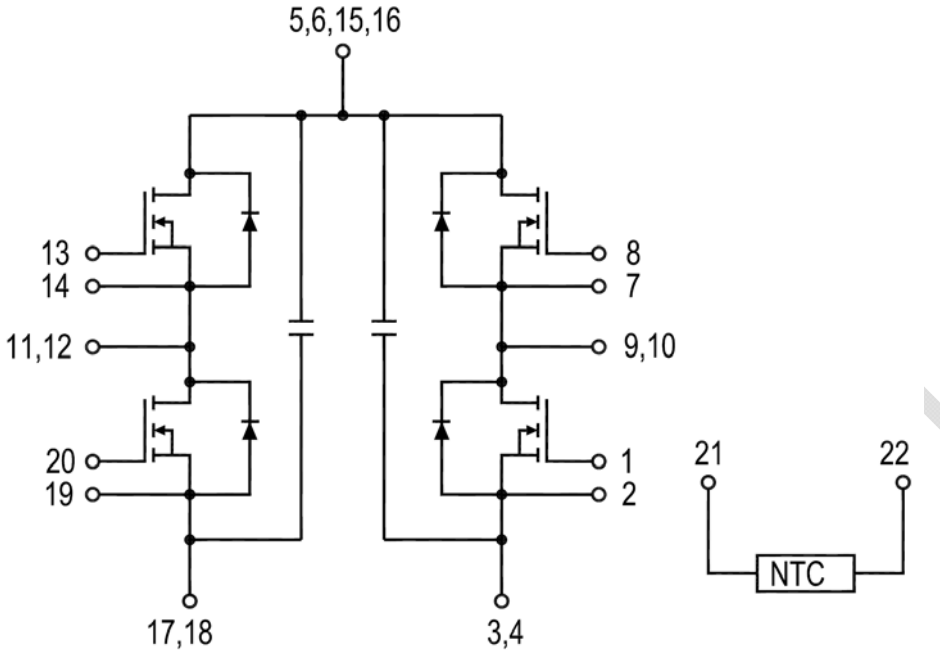
Internal NTC-Thermistor Characteristics

Parameters	Symbol	Conditions	Min	Typ	Max	Units
Zero Power Resistance	R_{25}	T_c=25 °C	--	5	--	kΩ
	R_{100}	T_c=100 °C	--	481	--	Ω
B Value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K
	$B_{25/80}$	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K
Power Dissipation	P_{25}	T_c=25 °C		50		mW

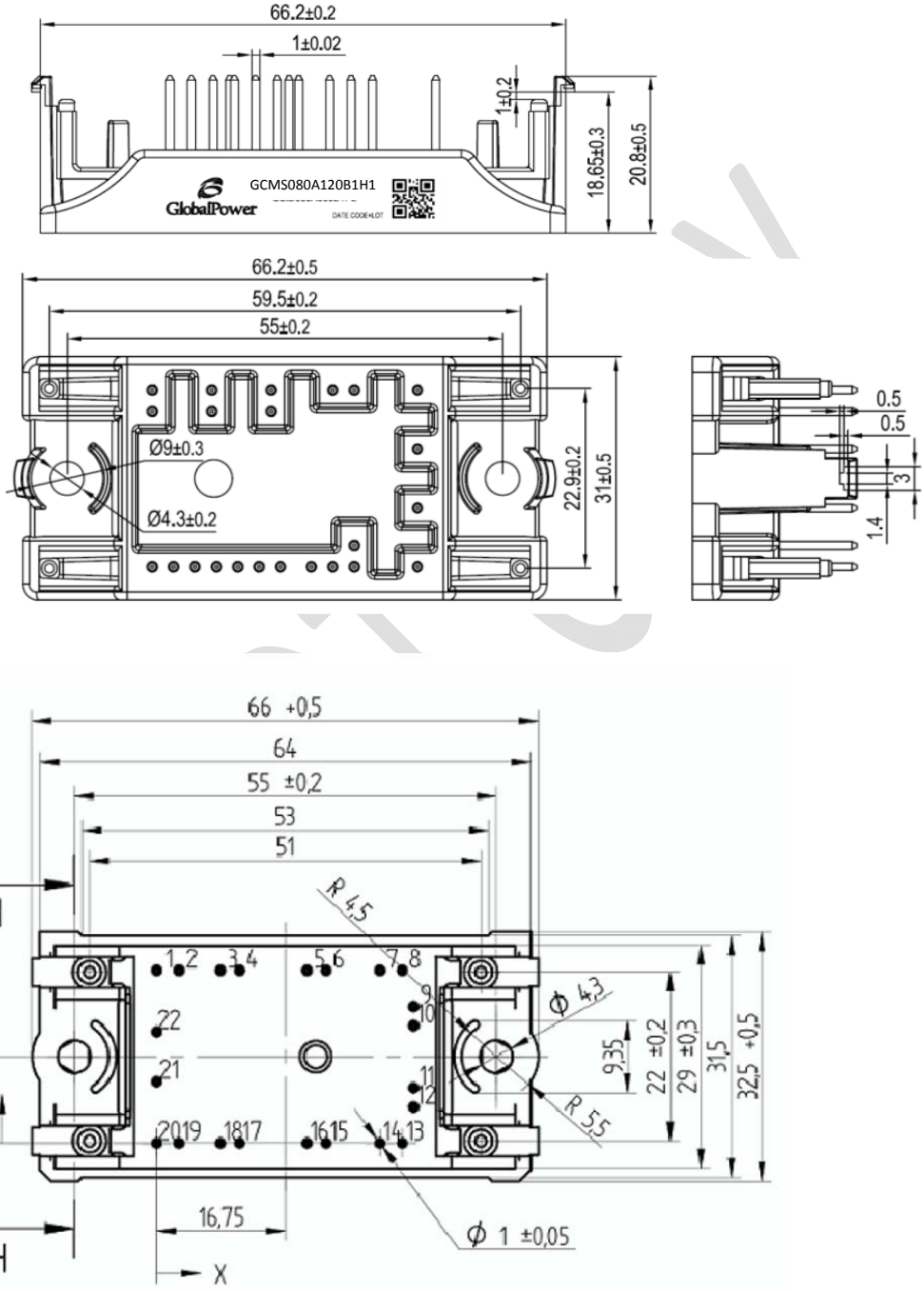
Thermal and Package Characteristics (T_j=25°C unless otherwise specified)

Parameters	Symbol	Conditions	Min	Typ	Max	Units
Junction to Case Thermal Resistance	R_{THJC}	MOSFET chip	--	--	0. 4	°C /W
Mounting Torque	M_d		1		1.5	N-m
Package Weight	W_t			25		g
Isolation Voltage	V_{ISOL}	I_{ISOL} < 1mA, 50/60Hz, t=1 min			2500	V

Internal Circuit:



Preliminary Package Outline (Unit: mm):



Revision History

Date	Revision	Notes
5/29/2015	0.1	Initial release

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Notes

- **RoHS Compliance**
  The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.gptechgroup.com.

- **REACh Compliance**
  REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemi- cal Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact our office at GPTG Headquarters in Lake Forest, California to insure you get the most up-to-date REACh SVHC Declaration.
  REACh banned substance information (REACh Article 67) is also available upon request.

- This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control.
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