S3M008120V1K-A

TriQSiC™1200V Silicon Carbide Power MOSFET G3 N Channel Enhancement

Features

- High speed switching
- Very low switching losses
- High blocking voltage with low on-resistance
- Temperature independent turn-off switching losses
- Halogen free, RoHS compliant

Benefits

- Cooling effort reduction
- Efficiency improvement
- Reduced cooling requirements
- Increased power density
- Increased system switching frequency

Part number	Die size

Applications

- EV motor drive
- PV string inverters
- Solar power optimizer
- Switch mode power supplies

Table 1 Key performance and package parameters

1 Maximum ratings

Table 2 Maximum rating (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{DS,max}$	Drain source voltage	1200	V	V_{GS} = 0V, I_D = 100 μA	
$V_{GS,max}$	Gate source voltage	-8 /+22	V	Absolute maximum values	Note1
$V_{GSpulse}$	Gate-source voltage,max. transient voltage	-10 /+25	V	$t_p \leq 0.5\mu s$, D 0.01	
V_{GSop}	Gate source voltage	-4 /+18	V	Recommended operational values	
I_D	Continuous drain current	218 154	A	V_{GS} = 18V, T_C = 25˚C V_{GS} = 18V, T_C = 100˚C	
$I_{D(pulse)}$	Pulsed d				

2.1 Static characteristics

Table 4 Static characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-source breakdown voltage	1200	-	-	V	V_{GS} = 0V, I_D = 100μA	
$V_{GS(th)}$	Gate threshold voltage	2.3	2.8	3.6	V	V_{DS} = V_{GS}, I_D = 30mA	Fig.11
		-	2.0	-	V	V_{DS} = V_{GS}, I_D = 30mA, T_J = 175°C	
I_{DSS}	Zero gate voltage drain current	-	1	10	μA	V_{DS} = 1200V, V_{GS} = 0V	
I_{GSS}	Gate source leakage current	-	-	100	nA	V_{GS} = 18V, V_{DS} = 0V	
$R_{DS(on)}$	Current drain-source on-state resistance	-	9.5	15	mΩ	V_{GS} = 15V, I_D = 106A	Fig.4,5,6
		-	16	-		V_{GS} = 15V, I_D = 106A, T_J = 175°C	
		-	8.4	12		V_{GS} = 18V, I_D = 106A	
		-	15	-		V_{GS} = 18V, I_D = 106A, T_J = 175°C	
g_{fs}	Transconductance	-	87	-	S	V_{DS} = 20V, I_D = 106A	Fig.7
	I v æ ĩ	-	76	-		V_{DS} = 20V, I_D = 106A, T_J = 175°C	
$R_{g,int}$	In roci						

Q_{gs}	Gate source charge	-	79	-	nC	V_{DS} = 800V, V_{GS} = -4/+18V I_D = 106A	Fig.12
Q_{gd}	Gate drain charge	-	64	-			
Q_g	Gate charge	-	257	-			

2.3



Figure 7. Transfer characteristic for various junction temperatures

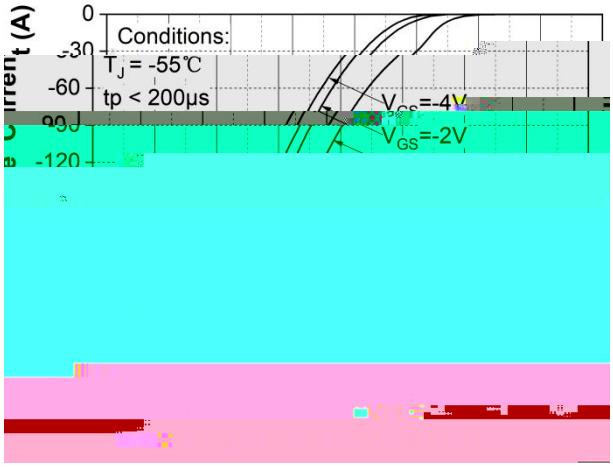


Figure 8. Body diode characteristic at T_J = -55 ºC

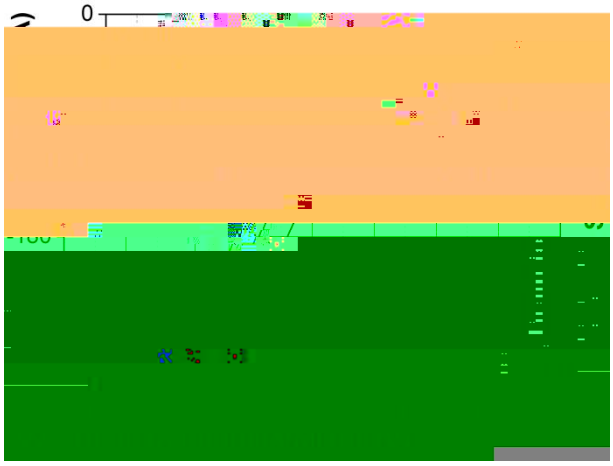


Figure 9. Body diode characteristic at T_J = 25 ºC

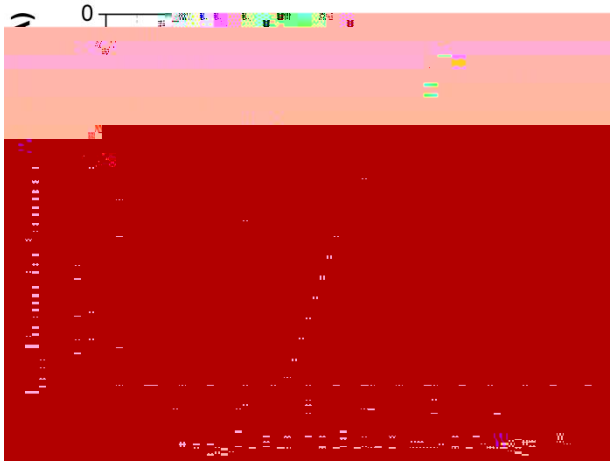


Figure 10. Body diode characteristic at T_J = 175ºC

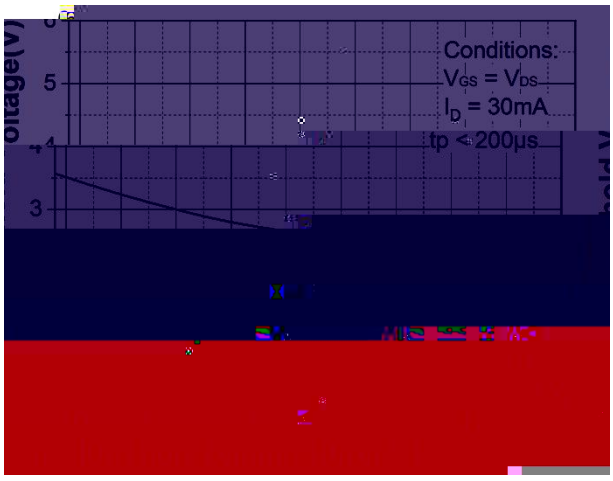


Figure 11. Threshold voltage vs. temperature

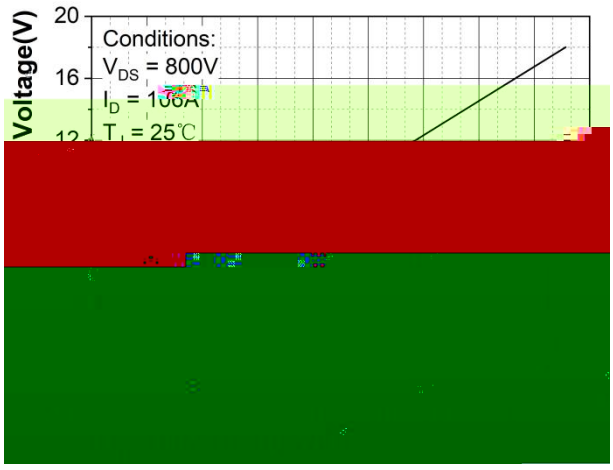


Figure 12. Gate charge characteristic

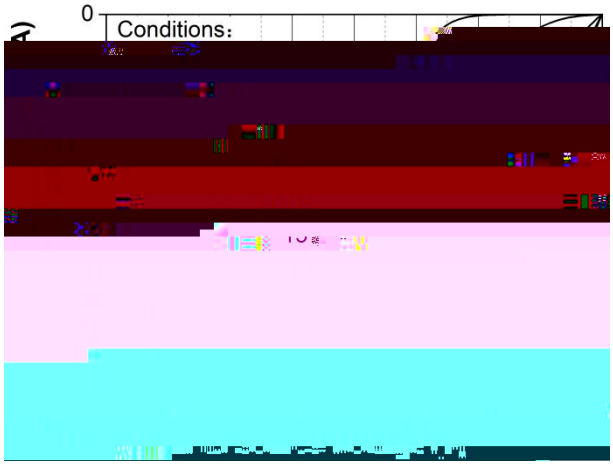


Figure 13. 3rd quadrant characteristic at T_J = -55 ºC

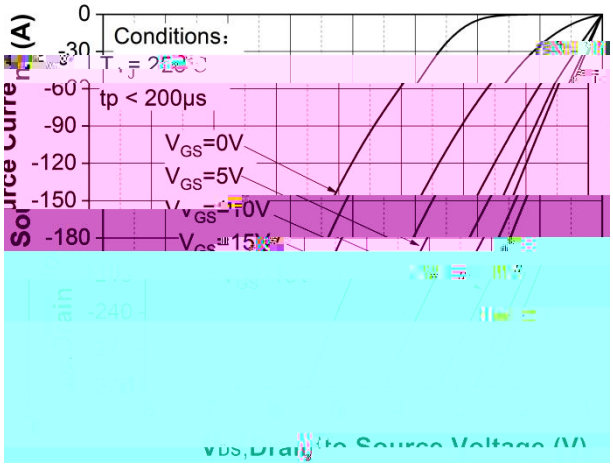


Figure 14. 3rd quadrant characteristic at T_J = 25 ºC

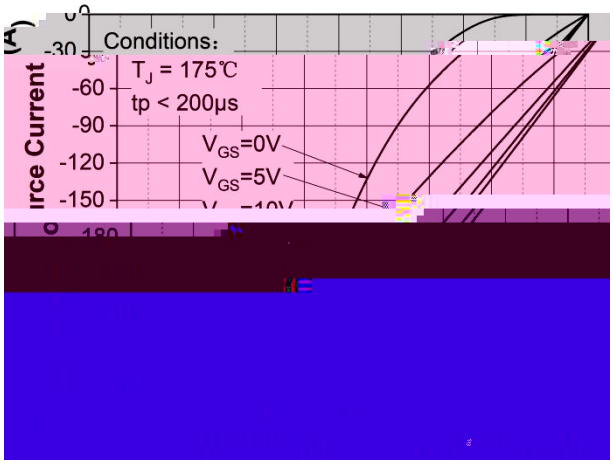


Figure 15. 3rd quadrant characteristic at T_J = 175 ºC

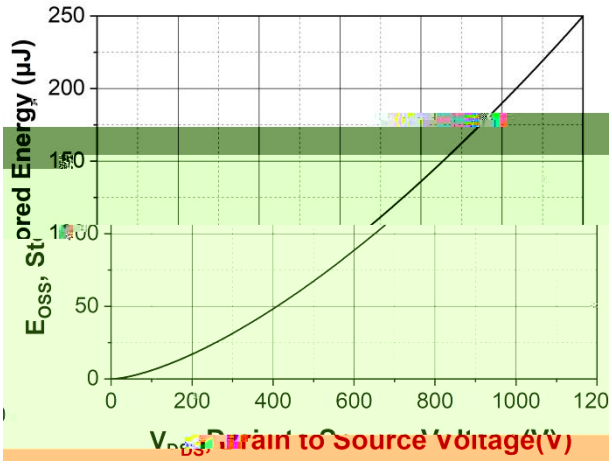


Figure 16. Output capacitor stored energy

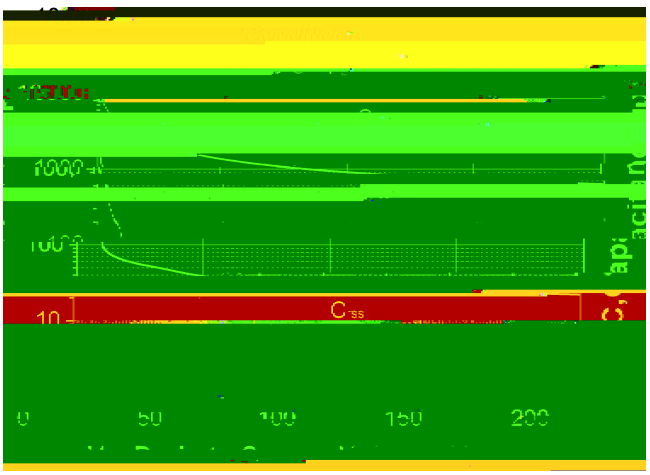


Figure 17. Capacitances vs. drain-source voltage (0 - 200V)

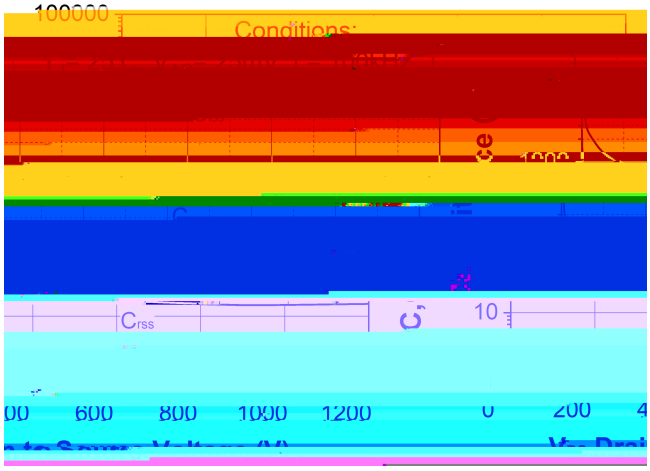


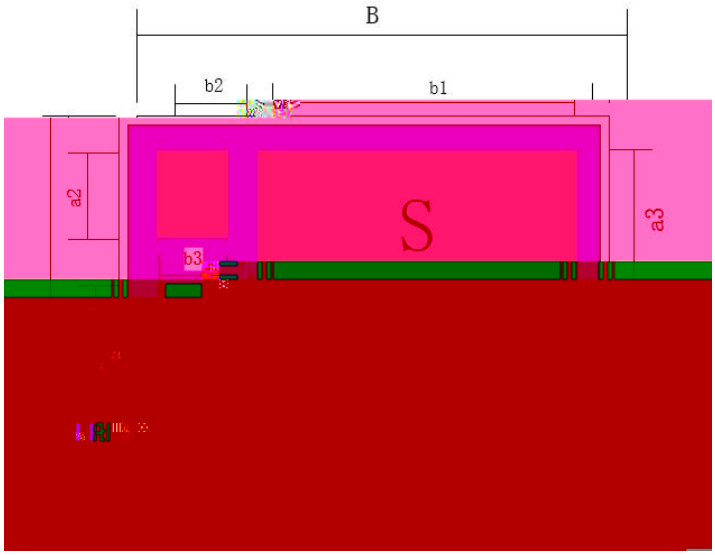
Figure 18. Capacitances vs. drain-source voltage (0 - 1200V)

4 Mechanical parameters

4.1 Dimensions and metallization

Parameter	Typical value	Unit	Metallization
Die size W x L	5.30 * 6.60	mm	
Gate pad size W x L	0.78 * 0.69	mm	
Source pad size W x L	2.05 * 4.70	mm	
Kelvin pad size W x L	1.40 * 0.70	mm	
Die thickness	150 ± 20	μm	
Top side gate & kelvin source metallization	4/4/12	μm	AlCu/Ni/Cu
Top side power source metallization	4/4/12	μm	AlCu/Ni/Cu
Back side drain metallization	1	μm	Ag

4.2 Layout



Symbol	Dimension / mm
B	6.60
b1	4.70
b2	0.70
b3	0.69
A	5.30
a1	0.78
a2	1.40
a3	2.05

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Datasheet

6. Due to technical requirements products may contain dangerous substances. For information on the types in question please contact Sichain office.

7. Except as otherwise explicitly approved by Sichain in a written document signed by authorized representatives of Sichain, Sichain' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

8. For use of our products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a Sichain representatives, for example but not limited to: transportation equipment,primary communication equipment,traffic lights,fire/crime prevention, safety equipment, medical systems, and power transmission systems.