S3M013120NK-A

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2 Electrical characteristics

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 = 20mA	Fig.11
		-	2.1	-	V	V_{DS} = V_{GS}, I_D = 20mA, 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	-	15	21	mΩ	V_{GS} = 15V, I_D = 70A	Fig.4,5,6
		-	24	-		V_{GS} = 15V, I_D = 70A, T_J = 175°C	
		-	12.6	17		V_{GS} = 18V, I_D = 70A	
		-	23	-		V_{GS} = 18V, I_D = 70A, T_J = 175°C	
g_{fs}	Transconductance	-	52	-	S	V_{DS} = 20V, I_D = 70A	Fig.7
		-	49	-		V_{DS} = 20V, I_D = 70A, T_J = 175°C	
$R_{g,int}$	Internal gate resistance	-	8.4	-	Ω	V_{AC} = 25mV, f = 1MHz, open drain	

2.2 Dynamic characteristics

Q_{gs}	Gate source charge	-	58	-	nC	V_{DS} = 800V, V_{GS} = -4/+18V I_D = 70A	Fig.12
Q_{gd}	Gate drain charge	-	40	-			
Q_g	Gate charge	-	197	-			

2.3 Switching characteristics

Table 6 Dynamic characteristics(Tc = 25°C unless otherwise specified,the data comes from TO-247-4L)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
E_{on}	Turn on switching energy	-	1901	-	μJ	V_{DS} = 800V, V_{GS} = -4/+18V I_D = 70A, Rg = 2.5Ω, L = 16.7μH	
E_{off}	Turn off switching energy	-	687	-			
$t_{d\ on}$	Turn on delay time	-	41	-	ns		
t_r	Rise time	-	37	-			
$t_{d\ off}$	Turn off delay time	-	93	-			
t_f	Fall time	-	20	-			

Table 7 Body diode characteristics(The data comes from TO-247-4L)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode forward voltage	-	3.7	-	V	V_{GS} = -4V, I_{SD} = 35A	Fig.8,9, 10
		-	3.3	-	V	V_{GS} = -4V, I_{SD} = 35A T_J = 175°C	
I_S	Continuous diode forward current	-	125	-	A	V_{GS} = -4V, Tc = 25°C	Note2
t_{rr}	Reverse recovery time	-	80	-	ns	V_R = 800V, V_{GS} = -4V I_D = 70A di/dt = 2150A/μs T_J = 175°C	
Q_{rr}	Reverse recovery charge	-	1247	-	nC		
I_{rrm}	Peak reverse recovery current	-	31	-	A		

Note2 : When using SiC Body Diode the maximum recommended V_{GS} = -4 V

3 Electrical characteristic diagrams

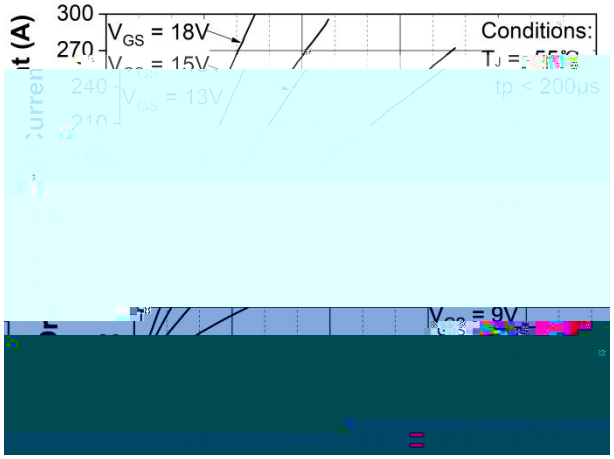


Figure 1. Output characteristics T_J = -55 ºC

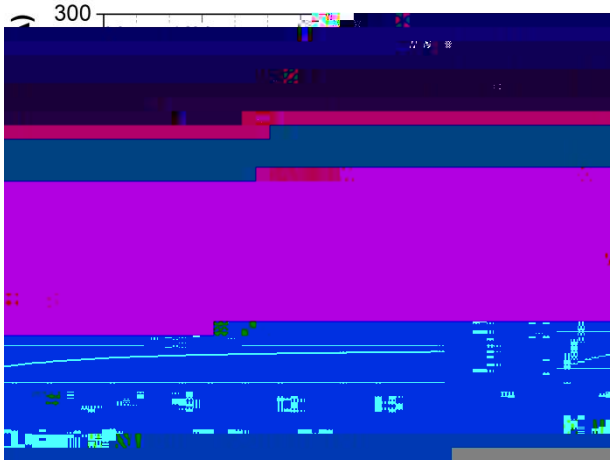


Figure 2. Output characteristics T_J = 25 ºC

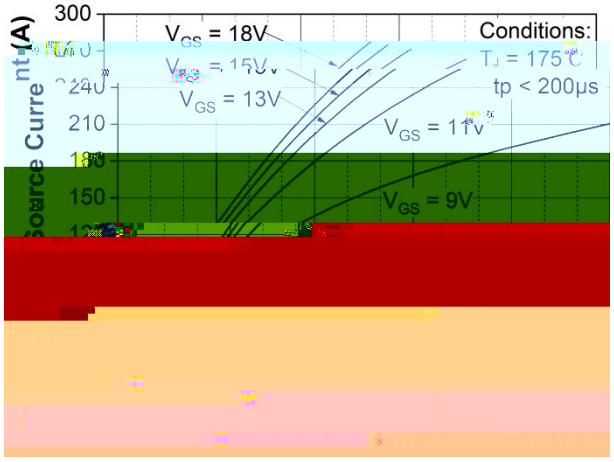


Figure 3. Output characteristics T_J = 175 ºC

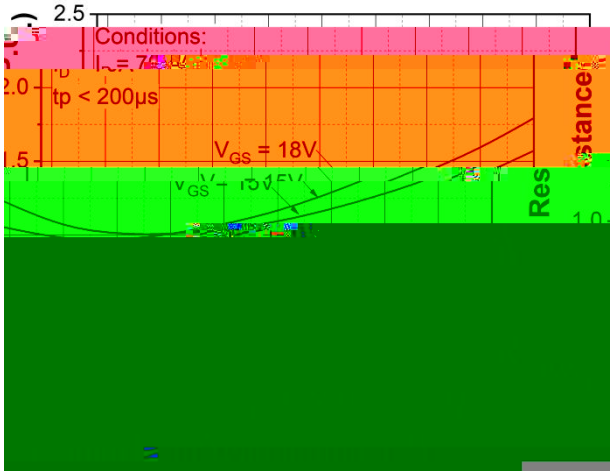


Figure 4. Normalized on-resistance vs. temperature

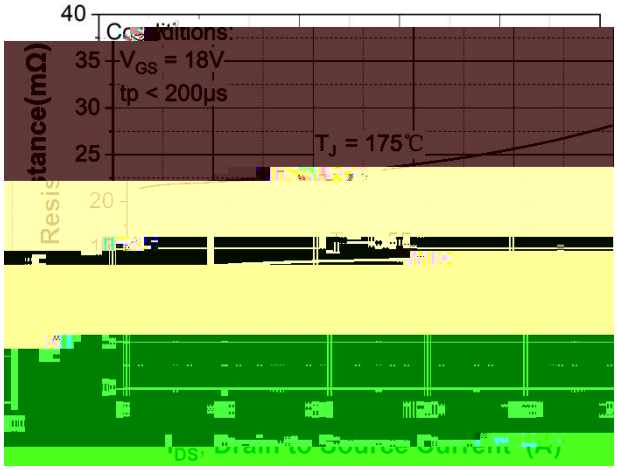


Figure 5. On-resistance vs. drain current for various temperatures

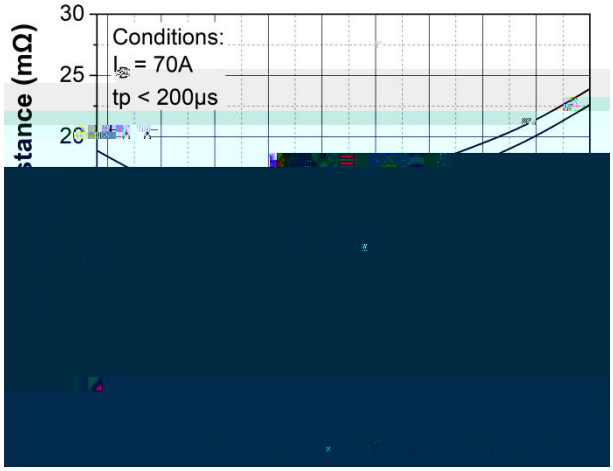


Figure 6. On-resistance vs. temperature for various gate voltages

Figure 7. Transfer characteristic for various junction t]rǎtj he ɤm "

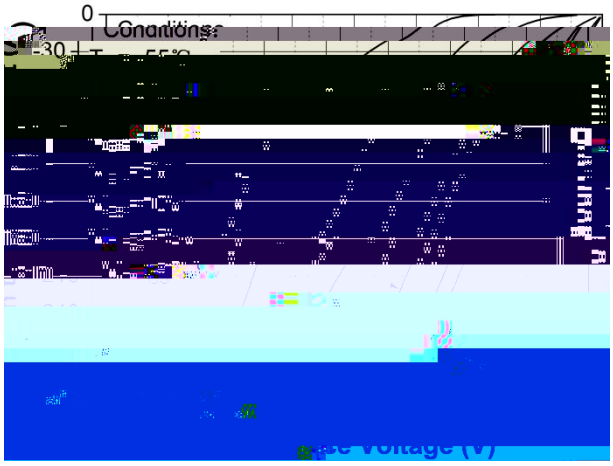


Figure 13. 3rd quadrant characteristic at T_J = -55 ºC

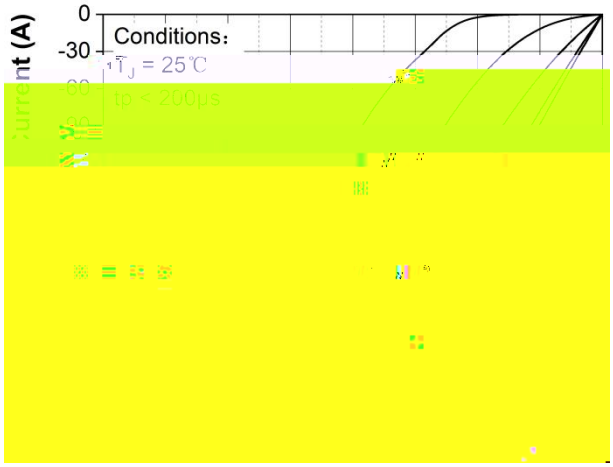


Figure 14. 3rd quadrant characteristic at T_J = 25 ºC

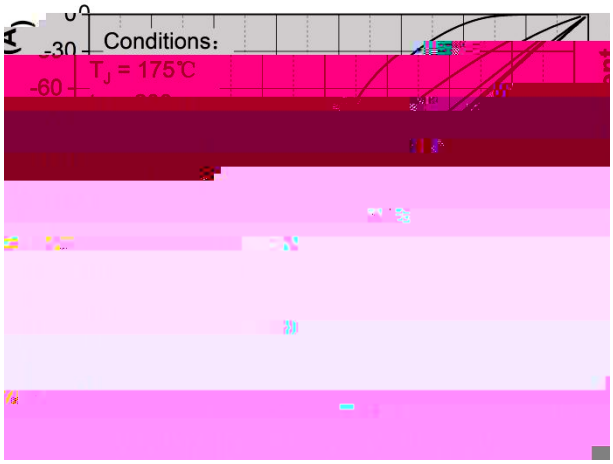


Figure 15. 3rd quadrant characteristic at T_J = 175 ºC

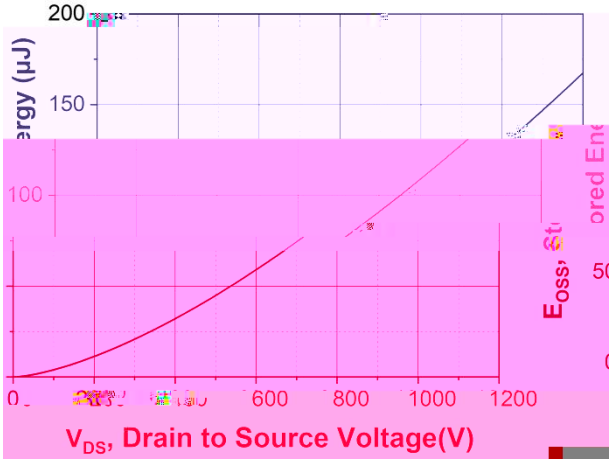


Figure 16. Output capacitor stored energy

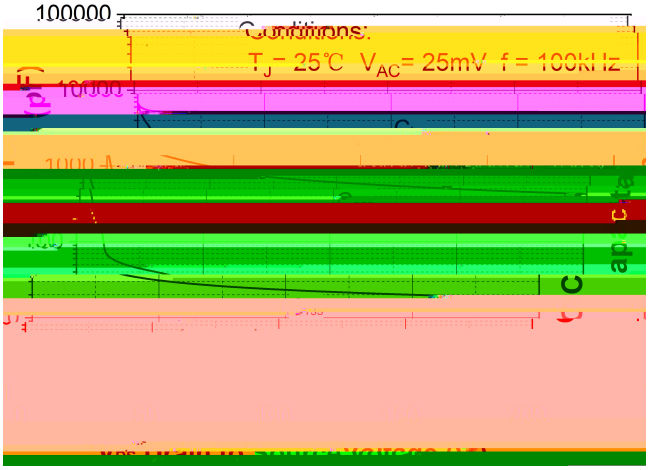


Figure 17. Capacitances vs. drain-source voltage (0 - 200V)

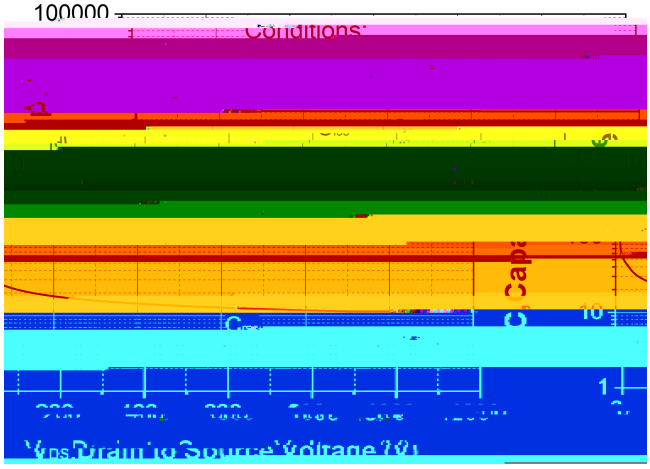
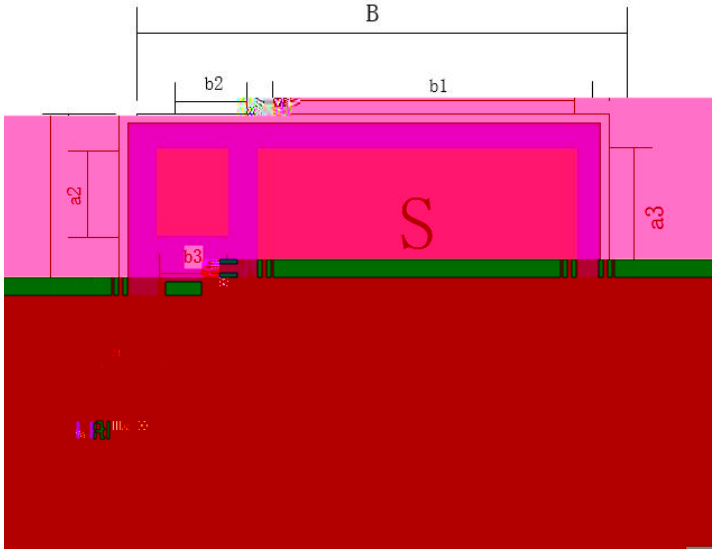


Figure 18. Capacitances vs. drain-source voltage (0 - 1200V)

4 Mechanical parameters

4.1 Dimensions and metallization

Parameter	Typical value	Unit	Metallization
Die size W x L	5 * 5	mm	
Gate pad size W x L	0.78 * 0.68	mm	
Source pad size W x L	1.9 * 3.1	mm	
Kelvin pad size W x L	1.25 * 0.70	mm	
Die thickness	150 ± 20	μm	
Top side source gate metallization	4/4/ r/ ĩ		



5 Test conditions

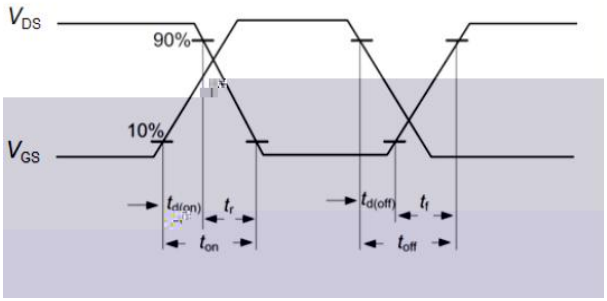


Figure A. Definition of switching times

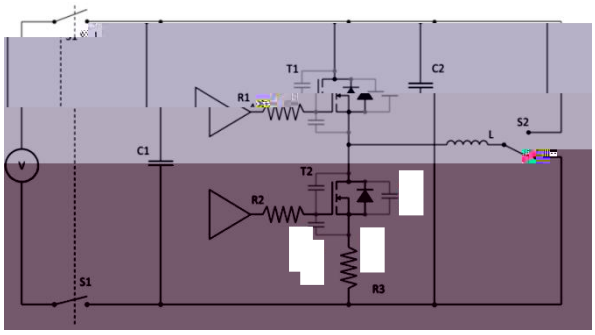


Figure B. Dynamic test circuit

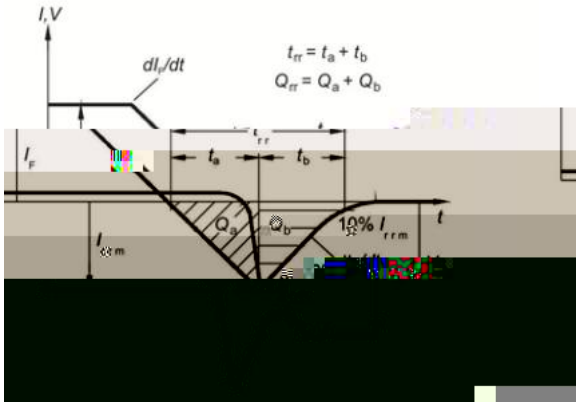


Figure C. Definition of body diode switching characteristics

Revision history

Document version	Date of release	Document stage	Description of changes
V01_00	2026-06-29	Final	——

Attention

1. **RoHS compliance**

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