



Silicon Carbide (SiC) MOSFET – EliteSiC, 14 mohm, 1200 V, M3P, D2PAK-7L

NTBG014N120M3P

Features

- Typ. $R_{DS(on)} = 14 \text{ m}\Omega$
- Low Switching Losses (Typ. $E_{ON} 1331 \text{ }\mu\text{J}$ at 74 A, 800 V)
- 100% Avalanche Tested

Typical Applications

- Solar Inverters
- Electric Vehicle Charging Stations
- UPS (Uninterruptible Power Supplies)
- Energy Storage Systems
- SMPS (Switch Mode Power Supplies)

MAXIMUM RATINGS ($T_J = 25 \text{ C}$ unless otherwise noted)

Symbol	Parameter			Value	Unit
V_{DSS}	Drain-to-Source Voltage			1200	V
V_{GS}	Gate-to-Source Voltage			-10/+22	V
I_D	Continuous Drain Current (Notes 2, 3)	Steady State	$T_C = 25 \text{ C}$	150	A
P_D	Power Dissipation (Note 2)			652	W
I_D	Continuous Drain Current (Notes 2, 3)	Steady State	$T_C = 100 \text{ C}$	106	A

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THERMAL CHARACTERISTICS

Symbol	Parameter	Typ	Max	Unit
R _{JC}	Thermal Resistance Junction-to-Case (Note 2)	–	0.23	°C/W
R _{JA}	Thermal Resistance Junction-to-Ambient (Note 1, 2)	–	40	°C/W

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value	Unit
Operation Values of Gate-to-Source Voltage	V _{GSop}	–5...–3 +18	V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ELECTRICAL CHARACTERISTICS (T_J = 25 °C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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OFF-STATE CHARACTERISTICS

V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 1 mA	1200			V
V _{(BR)DSS} / T _J	Drain-to-Source Breakdown Voltage Temperature Coefficient	I _D = 1 mA, refer to 25°C (Note 7)		0.3		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} = 0 V, V _{DS} = 1200 V, T _J = 25°C			100	μA
I _{GSS}	Gate-to-Source Leakage Current	V _{GS} = +22/–10 V, V _{DS} = 0 V			1	μA

ON-STATE CHARACTERISTICS

V _{GS(TH)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 37 mA	2.08	3.0	4.63	V
R _{DS(on)}	Drain-to-Source On Resistance	V _{GS} = 18 V, I _D = 74 A, T _J = 25°C		14	20	mΩ
		V _{GS} = 18 V, I _D = 74 A, T _J = 175°C (Note 7)		29		mΩ
		V _{GS} = 15 V, I _D = 74 A, T _J = 25°C		16	27	mΩ
		V _{GS} = 15 V, I _D = 74 A, T _J = 150°C (Note 7)		27		mΩ
g _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 74 A		29		S

CHARGES, CAPACITANCES & GATE RESISTANCE

C _{ISS}	Input Capacitance	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 800 V (Note 7)		6313		pF
C _{OSS}	Output Capacitance			259		
C _{RSS}	Reverse Transfer Capacitance			27		
Q _{G(TOT)}	Total Gate Charge	V _{GS} = –3/18 V, V _{DS} = 800 V, I _D = 74 A (Note 7)		377		nC
Q _{G(TH)}	Threshold Gate Charge			43		
Q _{GS}	Gate-to-Source Charge			78		
Q _{GD}	Gate-to-Drain Charge			98		
R _G	Gate Resistance	f = 1 MHz		1.4		Ω

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ELECTRICAL CHARACTERISTICS ($T_J = 25\text{ C}$ unless otherwise noted) (continued)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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SWITCHING CHARACTERISTICS

$t_{d(ON)}$	Turn-On Delay Time	$V_{GS} = -3/18\text{ V}$, $V_{DS} = 800\text{ V}$ $I_D = 74\text{ A}$, $R_G = 2\ \Omega$ Inductive Load (Notes 6, 7)		24		ns	
t_r	Rise Time			40			
$t_{d(OFF)}$	Turn-Off Delay Time			74			
t_f	Fall Time			14			
E_{ON}	Turn-On Switching Loss				1331		μJ
E_{OFF}	Turn-Off Switching Loss				620		
E_{TOT}	Total Switching Loss				1951		

DRAIN-SOURCE DIODE CHARACTERISTICS

I_{SD}	Continuous Drain-Source Diode Forward Current (Note 2)	$V_{GS} = -3\text{ V}$, $T_C 0.8\text{ } 124.5543\text{ } 66.9\text{ } .Tc84.617\text{ } .9071\text{ } 45.9h51Qi\text{ } 25$
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TYPICAL CHARACTERISTICS (CONTINUED)



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TYPICAL CHARACTERISTICS (CONTINUED)

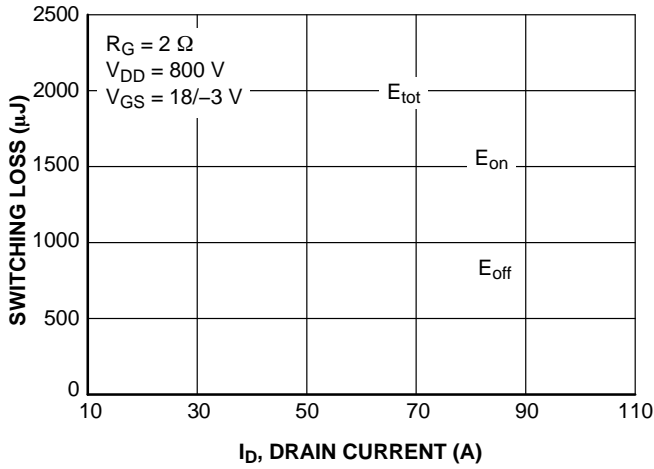


Figure 13. Switching Loss vs. Drain Current

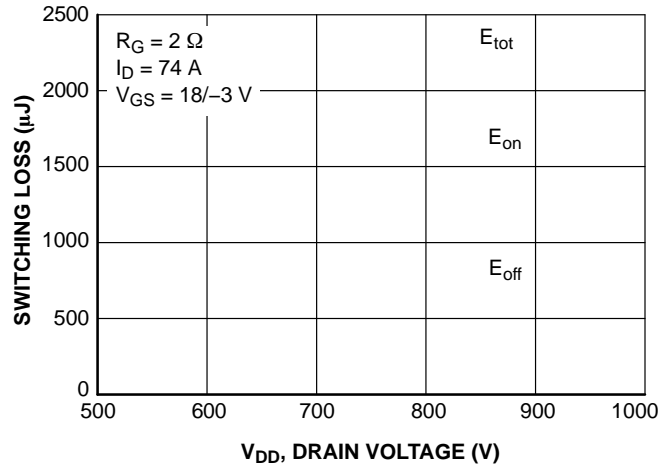


Figure 14. Switching Loss vs. Drain Voltage

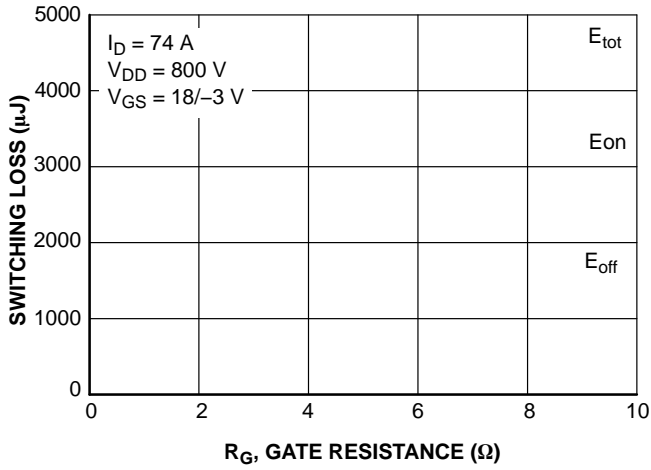


Figure 15. Switching Loss vs. Gate Resistance

Figure 16. Switching Loss vs. Temperature

D²PAK7 (TO-263-7L HV)
CASE 418BJ
ISSUE B

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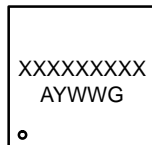
A

c2

H

C

**GENERIC
MARKING DIAGRAM***



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

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