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

NTBG014N120M3P

Features

Typ. $R_{DS(on)}$ = 14 mΩ

Low Switching Losses (Typ. E_{ON} 1331 μJ 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 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 C	150	A
P_D	Power Dissipation (Note 2)			652	W
I_D	Continuous Drain Current (Notes 2, 3)	Steady State	T_C = 100 C	106	A

THERMAL CHARACTERISTICS

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance Junction−to−Case (Note 2)	−	0.23	°C/W
$R_{\theta JA}$	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
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

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS						
$t_{d(ON)}$	Turn−On Delay Time	V_{GS} = −3/18 V, V_{DS} = 800 V I_D = 74 A, R_G = 2 Ω 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 V, $T_{C0\ 0\ 8\ 124.5543\ 66.9\ .Tc84.617\ .9071\ 45.9h51Qi\ 25}$				

TYPICAL CHARACTERISTICS (CONTINUED)

TYPICAL CHARACTERISTICS (CONTINUED)

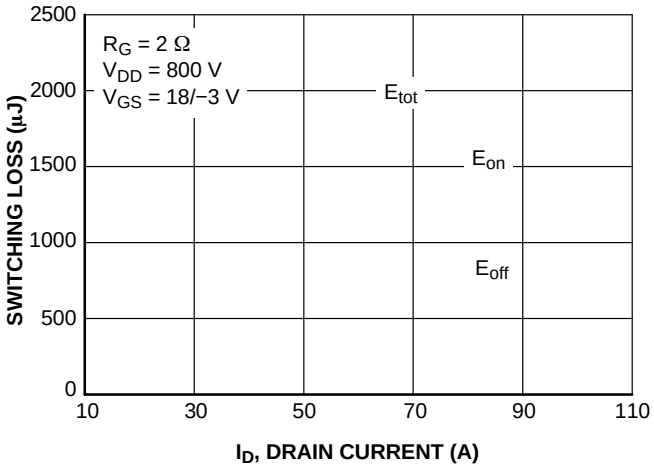


Figure 13. Switching Loss vs. Drain Current

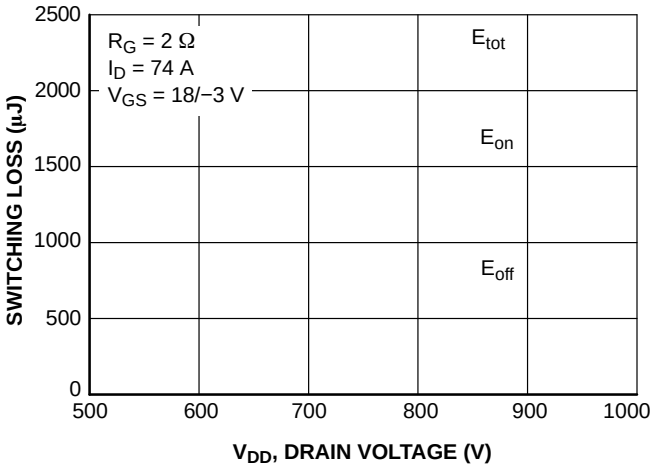


Figure 14. Switching Loss vs. Drain Voltage

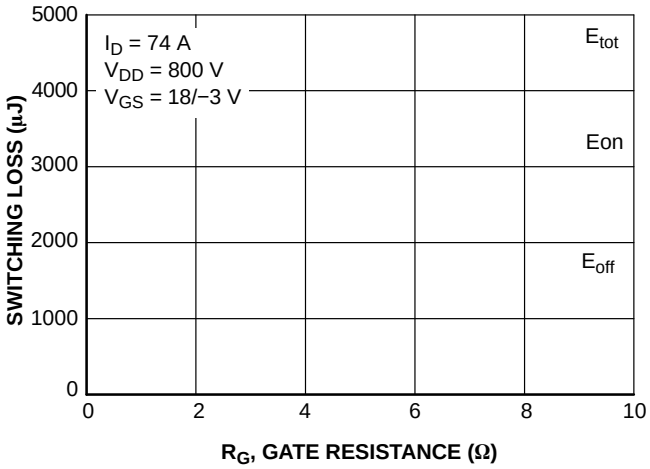
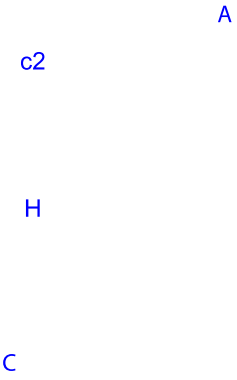


Figure 15. Switching Loss vs. Gate Resistance

Figure 16. Switching Loss vs. Temperature

D^{2}PAK7 (TO−263−7L HV)
CASE 418BJ
ISSUE B

DATE 16 AUG 2019



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.