

Silicon Carbide (SiC) Module - EliteSiC, 6 mΩ, 1200 V, SiC M3 MOSFET, 2-PACK Half Bridge Topology, F1 Package

NXH006P120M3F1PNG

The NXH006P120M3F1PNG is a power module containing 6 mΩ / 1200 V SiC MOSFET half-bridge and a thermistor with Si₃N₄ DBC in an F1 package.

Features

- 6 mΩ / 1200 V M3S SiC MOSFET Half-Bridge
- Si₃N₄ DBC
- Thermistor
- Press-Fit Pins
- These Devices are Pb-Free, Halide Free and are RoHS Compliant

Typical Applications

- Solar Inverter
- Uninterruptible Power Supplies
- Electric Vehicle Charging Stations
- Industrial Power

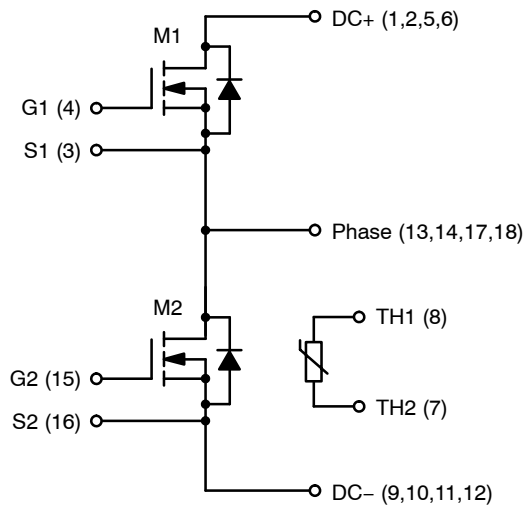
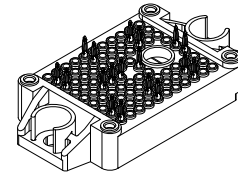
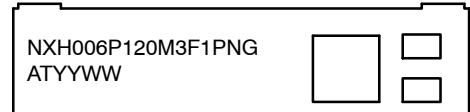


Figure 1. Schematic Diagram



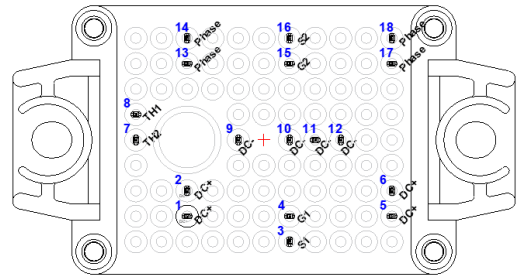
PIM18 33.8x42.5 (PRESS FIT)
CASE 180BW

MARKING DIAGRAM



NXH006P120M3F1PNG = Specific Device Code
AT = Assembly & Test Site Code
YYWW = Year and Work Week Code

PIN CONNECTIONS



See Pin Function Description for pin names

ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

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PIN FUNCTION DESCRIPTION

Pin	Name	Description
1	DC+	DC Positive Bus connection
2	DC+	DC Positive Bus connection
3	S1	M1 Kelvin Emitter (High side switch)
4	G1	M1 Gate (High side switch)
5	DC+	DC Positive Bus connection
6	DC+	DC Positive Bus connection
7	TH2	Thermistor Connection 2
8	TH1	Thermistor Connection 1
9	DC-	DC Negative Bus connection
10	DC-	DC Negative Bus connection
11	DC-	DC Negative Bus connection
12	DC-	DC Negative Bus connection
13	PHASE	Center point of half bridge
14	PHASE	Center point of half bridge
15	G2	M2 Gate (Low side switch)
16	S2	M2 Kelvin Emitter (Low side switch)
17	PHASE	Center point of half bridge
18	PHASE	Center point of half bridge

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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
SiC MOSFET			
Drain-to-Source Voltage	V_{DSS}	1200	V
Gate-to-Source Voltage	V_{GS}	+22/-10	V
Continuous Drain Current @ $T_C = 80\text{ }^\circ\text{C}$ (Note 2)	I_D	240	A
Pulsed Drain Current ($T_J = 175\text{ }^\circ\text{C}$, $t_p = 100\text{ }\mu\text{s}$)	I_{DM}	760	A
Maximum Power Dissipation @ $T_C = 80\text{ }^\circ\text{C}$ (Note 2)	P_{tot}	500	W
Minimum Operating Junction Temperature	T_{JMIN}	-40	$^\circ\text{C}$
Maximum Operating Junction Temperature	T_{JMAX}	175	$^\circ\text{C}$

THERMAL PROPERTIES

Storage Temperature Range	T_{stg}	-40 to 150	$^\circ\text{C}$
TIM Layer Thickness	T_{TIM}	160 \pm 20	μm

INSULATION PROPERTIES

Isolation Test Voltage, $t = 1\text{ s}$, 60 Hz	V_{is}	4800	V_{RMS}
Creepage Distance		12.7	mm
CTI		600	
Substrate Ceramic Material		Si_3N_4	
Substrate Ceramic Material Thickness		0.32	mm
Substrate Warpage (Note 3)	W	Max 0.18	mm

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Refer to ELECTRICAL CHARACTERISTICS, RECOMMENDED OPERATING RANGES and/or APPLICATION INFORMATION for Safe Operating parameters
2. Maximum continuous current and power, without switching losses, to reach $T_J = 175\text{ }^\circ\text{C}$ defined by design based on MOSFET $R_{DS(ON)}$ and $R_{\theta JC}$ and not subject to production test
3. Height difference between horizontal plane and substrate copper bottom

RECOMMENDED OPERATING RANGES

Rating	Symbol	Min	Max	Unit
Module Operating Junction Temperature	T_J	-40	150	$^\circ\text{C}$

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 ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
SiC MOSFET CHARACTERISTICS						
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}$, $V_{DS} = 1200\text{ V}$			300	μA
Drain-to-Source On Resistance	$R_{DS(ON)}$	$V_{GS} = 18\text{ V}$, $I_D = 120\text{ A}$, $T_J = 25\text{ }^\circ\text{C}$		6.0	9	$\text{m}\Omega$
		$V_{GS} = 18\text{ V}$, $I_D = 120\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$		7.5		
		$V_{GS} = 18\text{ V}$, $I_D = 120\text{ A}$, $T_J = 150\text{ }^\circ\text{C}$		8.5		
Gate-to-Source Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$, $I_D = 80\text{ mA}$	1.8	2.8	4.4	V
Gate Leakage Current	I_{GSS}	$V_{GS} = -10\text{ V} / 22\text{ V}$, $V_{DS} = 0\text{ V}$	-400		400	nA
Input Capacitance	C_{ISS}	$V_{DS} = 800\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 100\text{ kHz}$		13715		pF
Reverse Transfer Capacitance	C_{RSS}			52		
Output Capacitance	C_{OSS}			598		

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
SiC MOSFET CHARACTERISTICS							
Total Gate Charge	Q _{G(TOTAL)}	V _{DS} = 800 V, V _{GS} = -5/20 V, I _D = 100 A		622		nC	
Gate-to-Source Charge	Q _{GS}			91		nC	
Gate-to-Drain Charge	Q _{GD}			120		nC	
Turn-on Delay Time	t _{d(on)}	T _J = 25 °C V _{DS} = 800 V, I _D = 120 A V _{GS} = -5 V / 18 V, R _G = 1.8 Ω		43		ns	
Rise Time	t _r			14			
Turn-off Delay Time	t _{d(off)}			149			
Fall Time	t _f			13			
Turn-on Switching Loss per Pulse	E _{ON}				3.04		mJ
Turn-off Switching Loss per Pulse	E _{OFF}				0.24		
Turn-on Delay Time	t _{d(on)}		T _J = 150 °C V _{DS} = 800 V, I _D = 120 A V _{GS} = -5 V / 18 V, R _G = 1.8 Ω		40		ns
Rise Time	t _r			13			
Turn-off Delay Time	t _{d(off)}			160			
Fall Time	t _f			13.5			
Turn-on Switching Loss per Pulse	E _{ON}				3.71		mJ
Turn-off Switching Loss per Pulse	E _{OFF}				0.3		
Diode Forward Voltage	V _{SD}	I _D = 120 A, T _J = 25 °C		5.3	7.5	V	
		I _D = 120 A, T _J = 125 °C		4.91			
		I _D = 120 A, T _J = 150 °C		4.82			
Thermal Resistance – Chip-to-Case	R _{thJC}	M1, M2 (Note 4)		0.14	0.20	°C/W	
Thermal Resistance – Chip-to-Heatsink	R _{thJH}	Thermal grease, Thickness = 2 Mil +2%, A = 2.8 W/mK (Note 5)		0.29		°C/W	

Thermistor Characteristics

Nominal Resistance	R ₂₅	T _{NTC} = 25 °C		5		kΩ
Nominal Resistance	R ₁₀₀	T _{NTC} = 100 °C		493		Ω
Nominal Resistance	R ₁₅₀	T _{NTC} = 150 °C		159.5		Ω
Deviation of R ₁₀₀	ΔR/R	T _{NTC} = 100 °C	-5		5	%
Power Dissipation – Recommended Limit	P _D	0.15 mA, non-self-heating effect		0.1		mW
Power Dissipation – Absolute Maximum	P _D	5 mA		34.2		mW
Power Dissipation Constant				1.4		mW/K
B-value		B(25/50), tolerance ±2%		3375		K
B-value		B(25/100), tolerance ±2%		3436		K

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Test method compliant with MIL STD 883-1012.1, Cosmetic oxidation and discoloration on the DBC surface allowed
5. Defined by thermal simulation

ORDERING INFORMATION

Orderable Part Number	Marking	Package	Shipping
NXH006P120M3F1PNG	NXH006P120M3F1PNG	F2HALFBR: Case 180BY Press-fit Pins with pre-applied thermal interface material (TIM) (Pb-Free / Halide Free)	20 Units / Blister Tray

TYPICAL CHARACTERISTICS

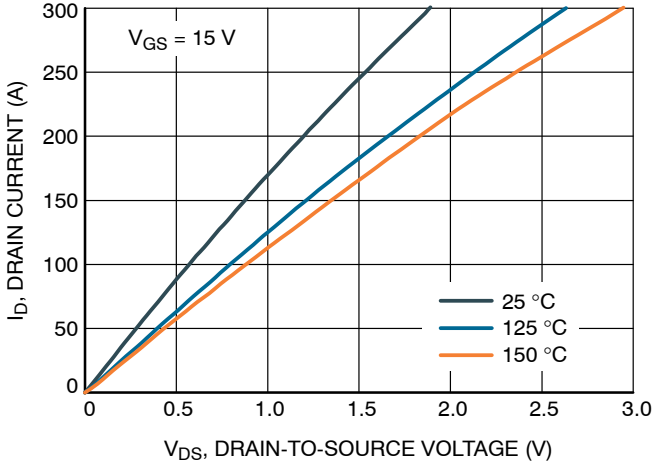


Figure 2. MOSFET Typical Output Characteristic

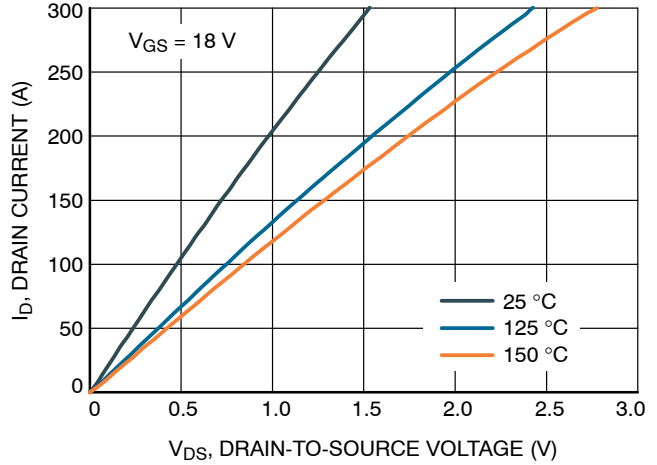


Figure 3. MOSFET Typical Output Characteristic

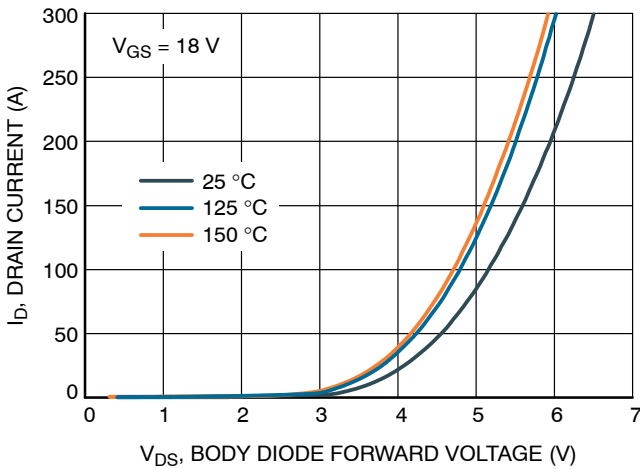


Figure 4. Body Diode Forward Characteristic

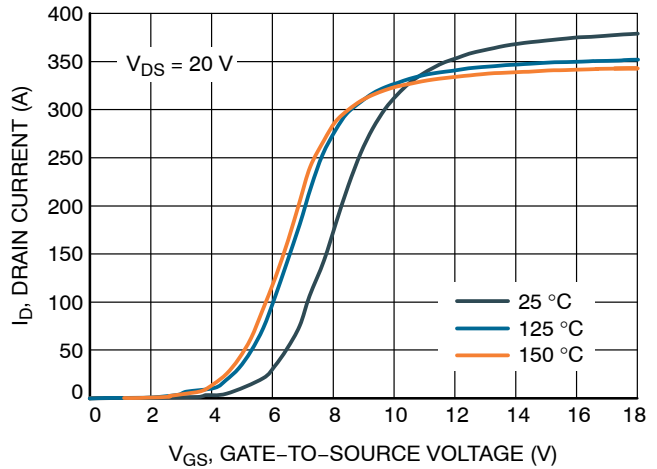


Figure 5. Transfer Characteristics

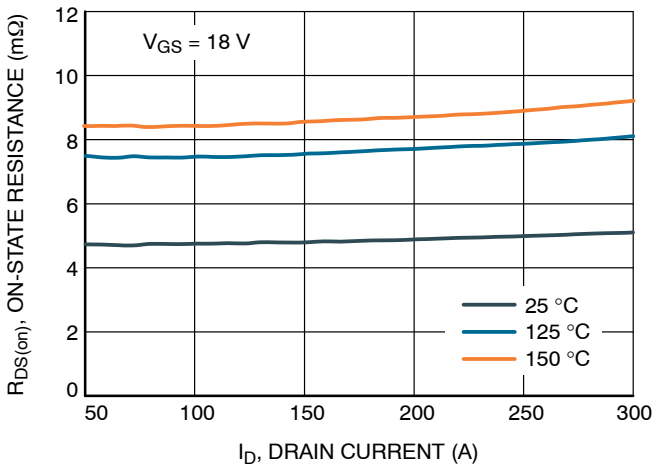


Figure 6. On-Resistance vs. Drain Current

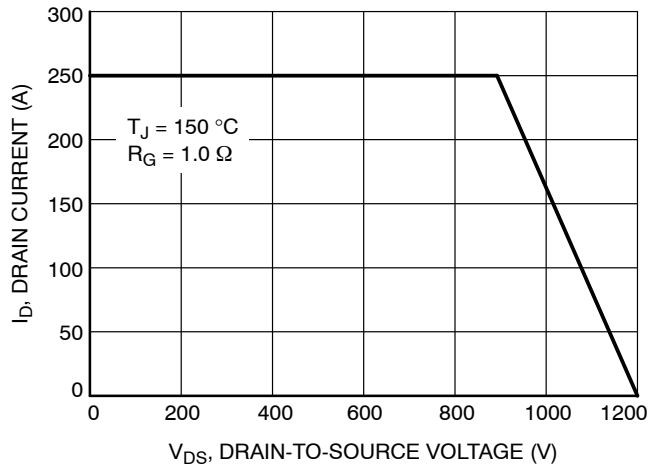


Figure 7. RBSOA

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TYPICAL CHARACTERISTICS

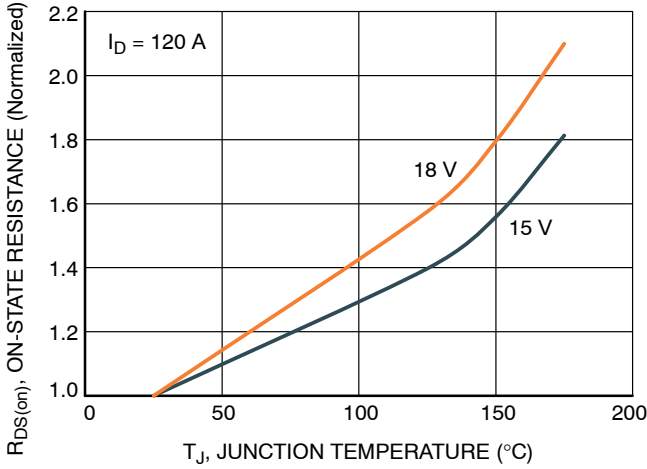


Figure 8. On-Resistance vs. Junction Temperature (Normalized)

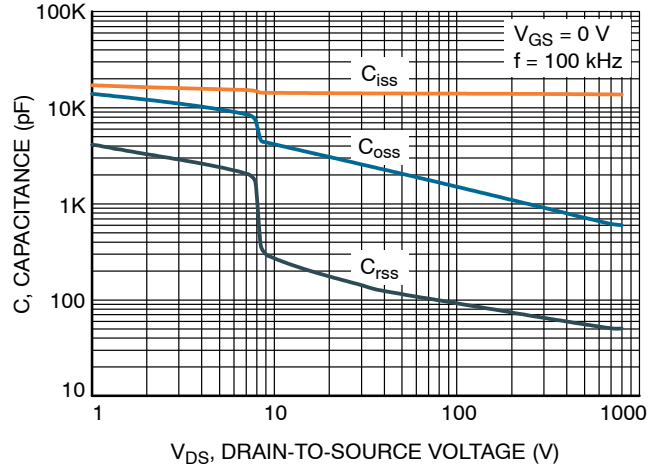


Figure 9. Capacitance Characteristics

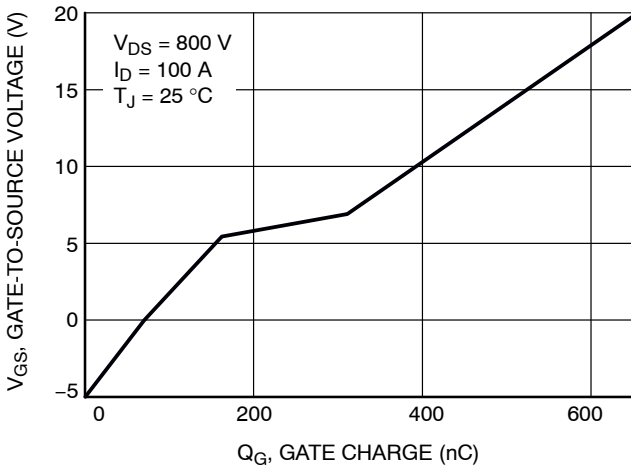


Figure 10. Gate Charge Characteristics

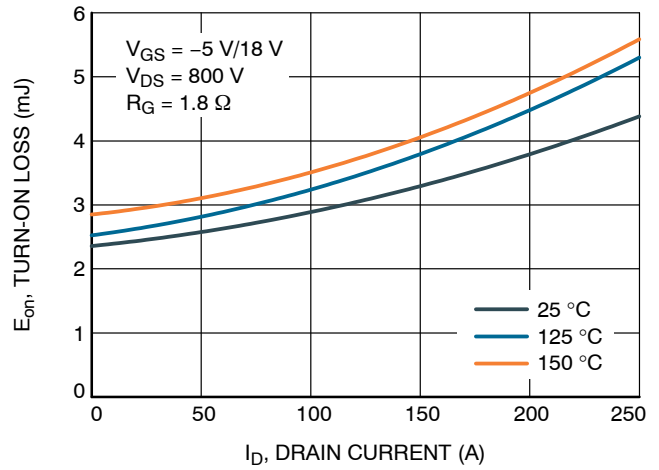


Figure 11. Typical Switching Loss E_{on} vs. Drain Current

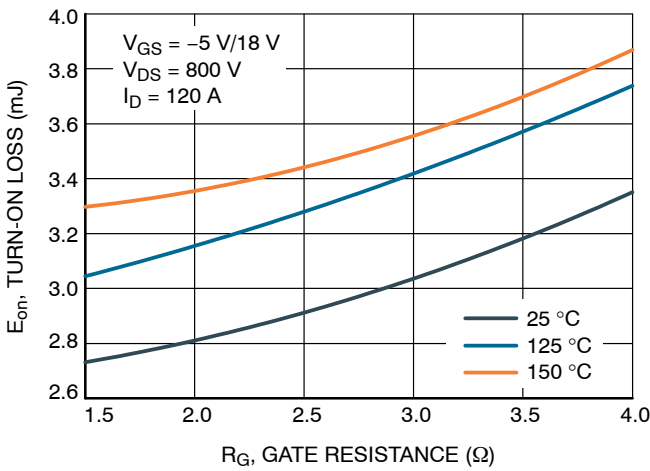


Figure 12. Typical Switching Loss E_{on} vs. R_g

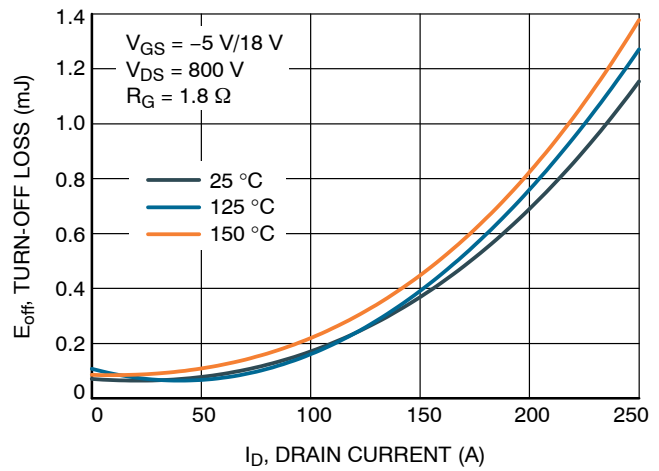


Figure 13. Typical Switching Loss E_{off} vs. Drain Current

TYPICAL CHARACTERISTICS

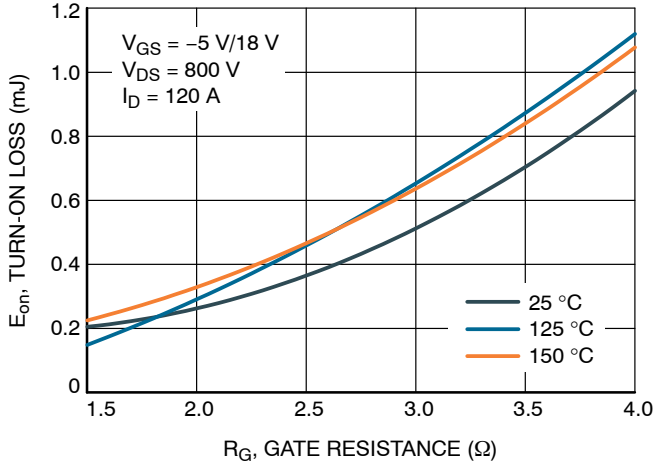


Figure 14. Typical Switching Loss Eoff vs. Rg

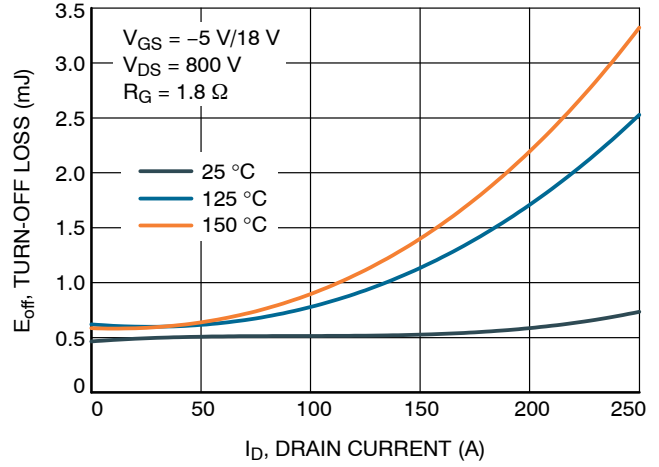


Figure 15. Err vs. Drain Current

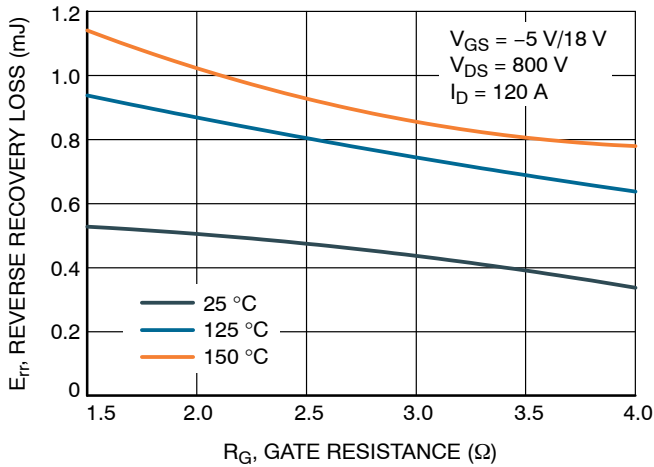


Figure 16. Err vs. Rg

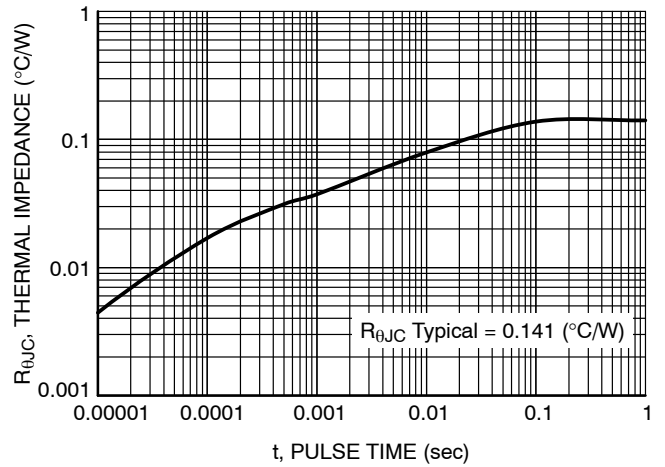


Figure 17. Thermal Response Characteristics

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REVISION HISTORY

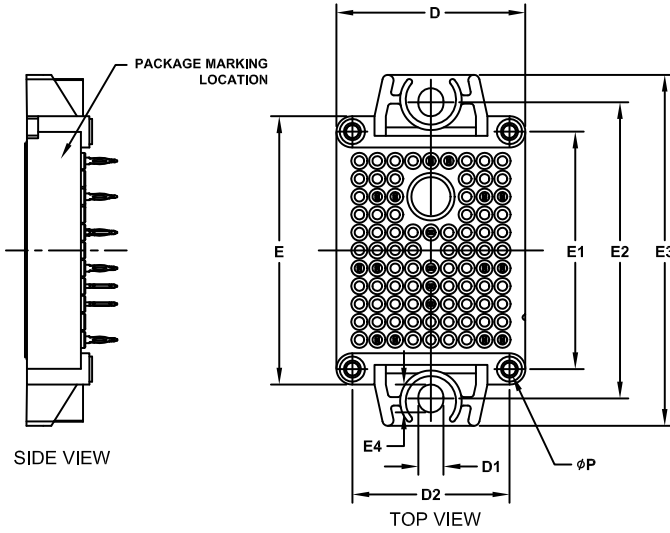
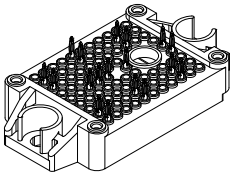
Revision	Description of Changes	Date
0	Initial document release.	5/15/2026

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PACKAGE DIMENSIONS

PIM18 33.8x42.5 (PRESS FIT)
CASE 180BW
ISSUE B

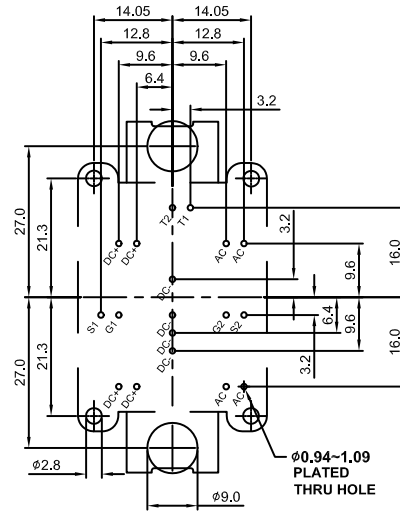
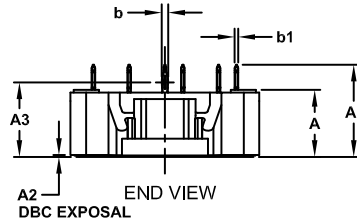
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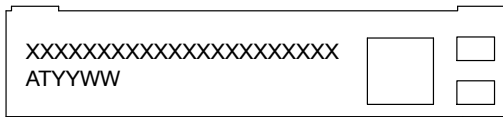
NOTES:

1. CONTROLLING DIMENSION: MILLIMETERS
2. PIN POSITION TOLERANCE IS $\pm 0.4\text{mm}$

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	11.65	12.00	12.35
A1	16.00	16.50	17.00
A2	0.00	0.35	0.60
A3	12.85	13.35	13.85
b	1.15	1.20	1.25
b1	0.59	0.64	0.69
D	33.50	33.80	34.10
D1	4.40	4.50	4.60
D2	27.95	28.10	28.25
E	47.70	48.00	48.30
E1	42.35	42.50	42.65
E2	52.90	53.00	53.10
E3	62.30	62.80	63.30
E4	4.90	5.00	5.10
P	2.20	2.30	2.40



GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code
AT = Assembly & Test Site Code
YYWW = Year and Work Week Code

*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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