

TMPIM 35 A Enhances CIB Module

NXH35C120L2C2ESG

The NXH35C120L2C2ESG is a transfer-molded power module with low thermal resistance substrate containing a converter-inverter-brake circuit consisting of six 35 A, 1600 V rectifiers, six 35 A, 1200 V IGBTs with inverse diodes, one 35 A, 1200 V brake IGBT with brake diode and an NTC thermistor.

Features

- Low Thermal Resistance Substrate for Low Thermal Resistance
- 6 mm Clearance Distance between Pin to Heatsink
- Compact 73 mm × 40 mm × 8 mm Package
- Solderable Pins
- Thermistor
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Industrial Motor Drives
- Servo Drives

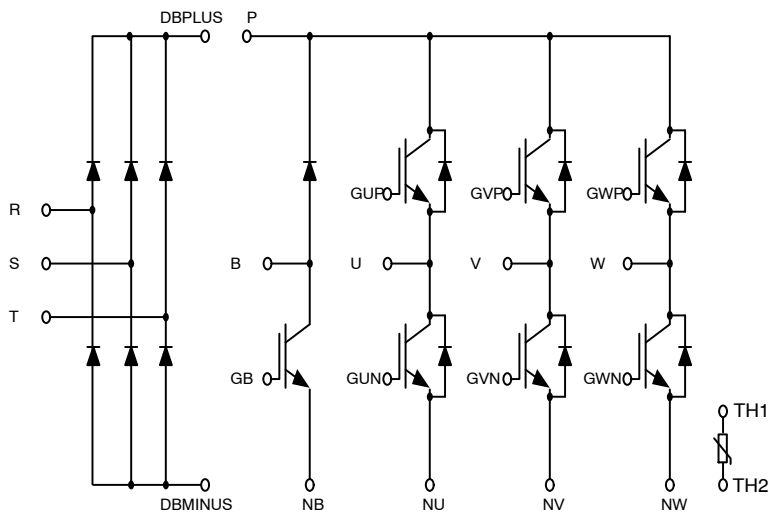
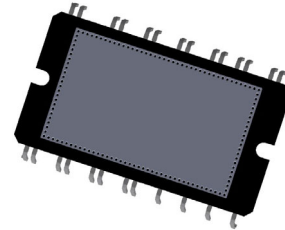


Figure 1. NXH35C120L2C2ESG Schematic Diagram



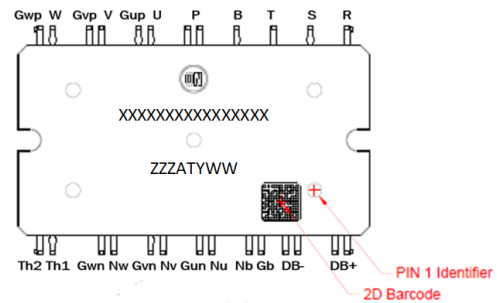
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DIP26 67.8x40
CASE 181AD

MARKING DIAGRAM



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

ORDERING INFORMATION

Device	Package	Shipping†
NXH35C120L2C2ESG	DIP26 (Pb-Free)	6 Units / Tube

NXH35C120L2C2ESG

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
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IGBT

Collector–Emitter Voltage	V_{CES}	1200	V
Gate–Emitter Voltage	V_{GE}	± 20	V
Continuous Collector Current @ $T_C = 80^\circ\text{C}$ ($T_{V_{Jmax}} = 175^\circ\text{C}$)	I_C	35	A
Pulsed Collector Current	I_{Cpulse}	105	A

DIODE

Peak Repetitive Reverse Voltage	V_{RRM}	1200	V
Continuous Forward Current @ $T_C = 80^\circ\text{C}$ ($T_{V_{Jmax}} = 175^\circ\text{C}$)	I_F	35	A
Repetitive Peak Forward Current	I_{FRM}	105	A

RECTIFIER DIODE

Peak Repetitive Reverse Voltage	V_{RRM}	1600	V
Continuous Forward Current @ $T_C = 80^\circ\text{C}$ ($T_{V_{Jmax}} = 150^\circ\text{C}$)	I_F	35	A
Repetitive Peak Forward Current	I_{FRM}	105	A
I^2t value (10 ms single half–sine wave) @ 25°C (10 ms single half–sine wave) @ 150°C	I^2t	1126 510	A^2t
Surge current (10 ms $\sin 180^\circ$) @ 25°C	IFSM	520	A

THERMAL PROPERTIES

Storage Temperature range	T_{stg}	–40 to 125	$^\circ\text{C}$
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INSULATION PROPERTIES

Isolation test voltage, $t = 1$ sec, 50Hz	V_{is}	3000	V_{RMS}
Internal isolation		HPS	
Creepage distance		6.0	mm
Clearance distance		6.0	mm
Comperative Tracking Index	CTI	> 400	

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.

NXH35C120L2C2ESG

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

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit	
IGBT CHARACTERISTICS							
Collector-Emitter Cutoff Current	V _{GE} = 0 V, V _{CE} = 1200 V	I _{CES}	–	–	250	μA	
Collector-Emitter Saturation Voltage	V _{GE} = 15 V, I _C = 35 A, T _J = 25°C	V _{CE(sat)}	–	1.8	2.4	V	
	V _{GE} = 15 V, I _C = 35 A, T _J = 150°C		–	1.9	–		
Gate-Emitter Threshold Voltage	V _{GE} = V _{CE} , I _C = 4.25 mA	V _{GE(TH)}	4.8	6	6.8	V	
Gate Leakage Current	V _{GE} = 20 V, V _{CE} = 0 V	I _{GES}	–	–	400	nA	
Turn-on Delay Time	T _J = 25 °C V _{CE} = 600 V, I _C = 35 A V _{GE} = ±15 V, R _G = 15 Ω	t _{d(on)}	–	104	–	ns	
Rise Time		t _r	–	64	–		
Turn-off Delay Time		t _{d(off)}	–	277	–		
Fall Time		t _f	–	53	–		
Turn-on Switching Loss per Pulse		E _{on}	–	2900	–		μJ
Turn off Switching Loss per Pulse		E _{off}	–	1200	–		
Turn-on Delay Time	T _J = 150°C V _{CE} = 600 V, I _C = 35 A V _{GE} = ±15 V, R _G = 15 Ω	t _{d(on)}	–	168	–	ns	
Rise Time		t _r	–	72	–		
Turn-off Delay Time		t _{d(off)}	–	320	–		
Fall Time		t _f	–	165	–		
Turn-on Switching Loss per Pulse		E _{on}	–	4030	–		μJ
Turn off Switching Loss per Pulse		E _{off}	–	2200	–		
Input Capacitance	V _{CE} = 20 V, V _{GE} = 0 V f = 100 kHz	C _{ies}	–	8333	–	pF	
Output Capacitance		C _{oes}	–	298	–		
Reverse Transfer Capacitance		C _{res}	–	175	–		
Total Gate Charge	V _{CE} = 600 V, I _C = 35 A, V _{GE} = 0 V ~ +15 V	Q _g	–	360	–	nC	
Temperature under switching conditions		T _{vj op}	–40		150	°C	
Thermal Resistance – chip-to-heatsink	Thermal grease, Thickness – 3 mil, λ = 2.8 W/mK	R _{thJH}	–	0.83	–	°C/W	

DIODE CHARACTERISTICS

Brake Diode Reverse Leakage Current	V _R = 1200 V	I _R	–	–	200	μA	
Diode Forward Voltage	I _F = 35 A, T _J = 25°C	V _F	–	2.2	2.7	V	
	I _F = 35 A, T _J = 150°C		–	2	–		
Reverse Recovery Time	T _J = 25°C V _{CE} = 600 V, I _C = 35 A V _{GE} = ±15 V, R _G = 15 Ω	t _{rr}	–	224	–	ns	
Reverse Recovery Charge		Q _{rr}	–	1.51	–	μC	
Peak Reverse Recovery Current		I _{RRM}	–	18	–	A	
Reverse Recovery Energy		E _{rr}	–	410	–	μJ	
Reverse Recovery Time		T _J = 150 °C V _{CE} = 600 V, I _C = 35 A V _{GE} = ±15 V, R _G = 15 Ω	t _{rr}	–	532	–	ns
Reverse Recovery Charge			Q _{rr}	–	5.36	–	μC
Peak Reverse Recovery Current	I _{RRM}		–	30	–	A	
Reverse Recovery Energy	E _{rr}		–	1983	–	μJ	
Temperature under switching conditions		T _{vj op}	–40		150	°C	
Thermal Resistance – chip-to-heatsink	Thermal grease, Thickness – 3mil, λ = 2.8 W/mK	R _{thJH}	–	1.4	–	°C/W	

NXH35C120L2C2ESG

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

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
RECTIFIER DIODE CHARACTERISTICS						
Rectifier Reverse Leakage Current	$V_R = 1600\text{ V}$	I_R	–	–	200	μA
Rectifier Forward Voltage	$I_F = 35\text{ A}, T_J = 25^\circ\text{C}$	V_F	–	1.1	1.5	V
	$I_F = 35\text{ A}, T_J = 150^\circ\text{C}$		–	1	–	
Temperature under switching conditions		$T_{vj\text{ op}}$	–40		150	$^\circ\text{C}$
Thermal Resistance – chip-to-heatsink	Thermal grease, Thickness – 3 mil, $\lambda = 2.8\text{ W/mK}$	R_{thJH}	–	1.25	–	$^\circ\text{C/W}$

THERMISTOR CHARACTERISTICS

Nominal resistance	$T = 25^\circ\text{C}$	R_{25}	–	5	–	$\text{k}\Omega$
Nominal resistance	$T = 100^\circ\text{C}$	R_{100}	–	493.3	–	Ω
Deviation of R25		$\Delta R/R$	–5	–	5	%
Power dissipation		P_D	–	20	–	mW
Power dissipation constant			–	1.4	–	mW/K
B-value	B(25/50), tolerance $\pm 2\%$		–	3375	–	K
B-value	B(25/100), tolerance $\pm 2\%$		–	3433	–	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.

TYPICAL CHARACTERISTICS – INVERTER/BRAKE IGBT & DIODE

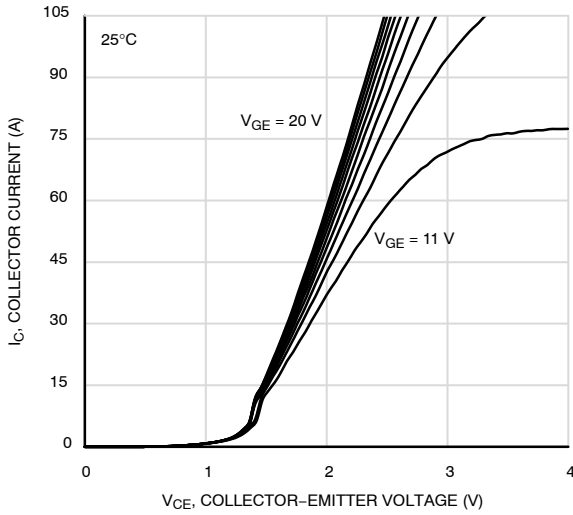


Figure 2. IGBT Typical Output Characteristic

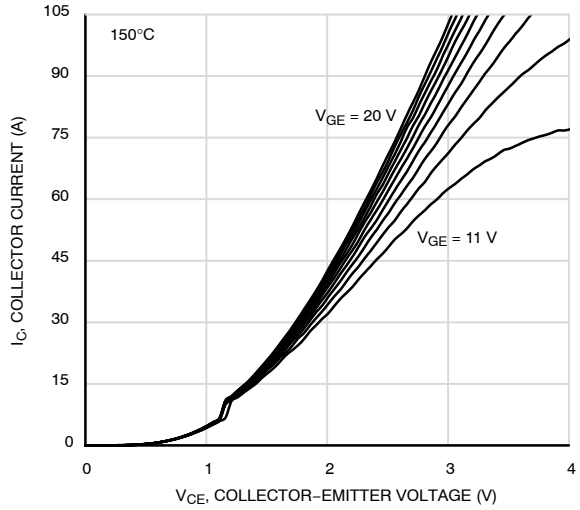


Figure 3. IGBT Typical Output Characteristic

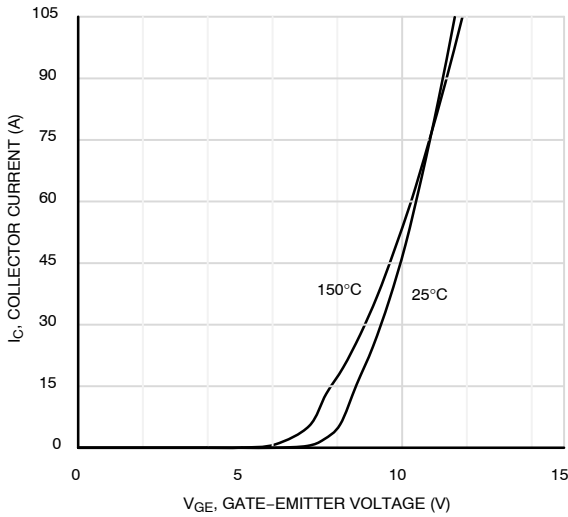


Figure 4. IGBT Typical Output Characteristic

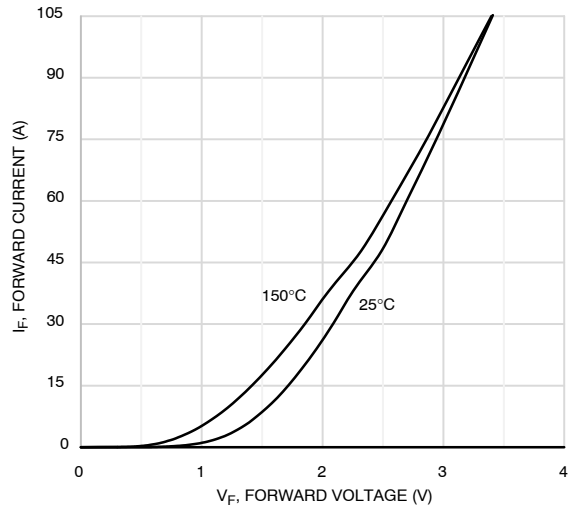


Figure 5. Diode Typical Forward Characteristic

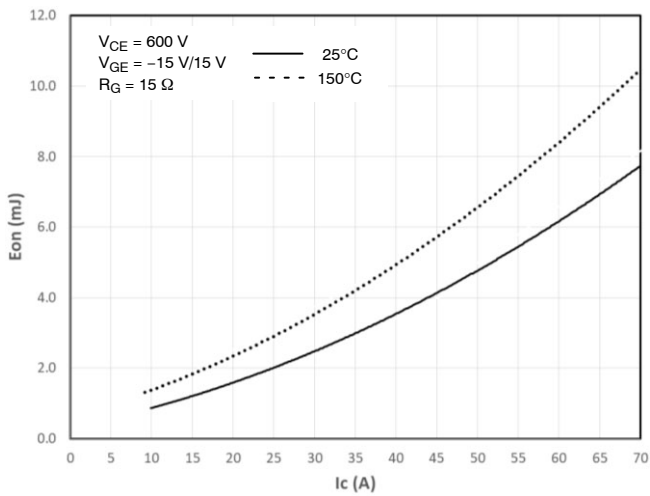


Figure 6. Typical Turn On Loss vs Ic

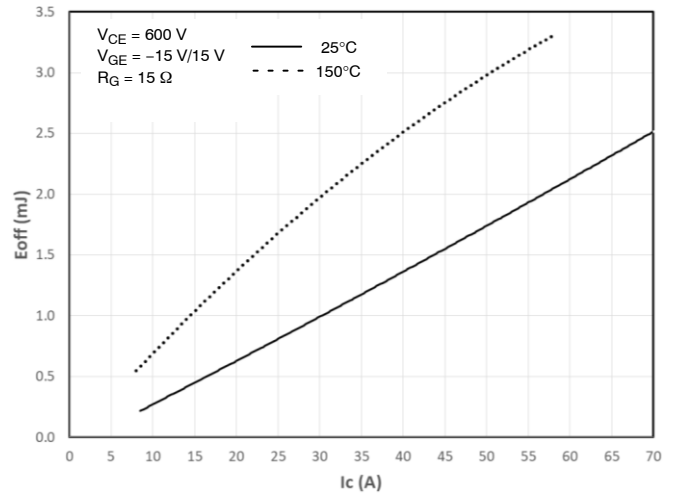


Figure 7. Typical Turn Off Loss vs Ic

NXH35C120L2C2ESG

TYPICAL CHARACTERISTICS – INVERTER/BRAKE IGBT & DIODE

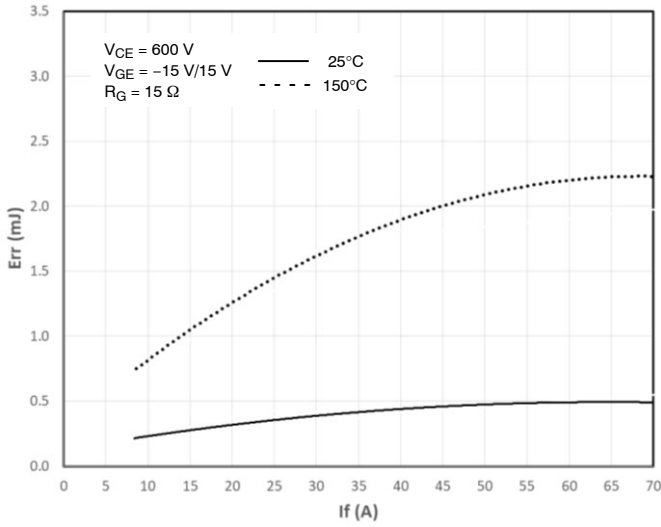


Figure 8. Typical Reverse Recovery Energy vs I_c

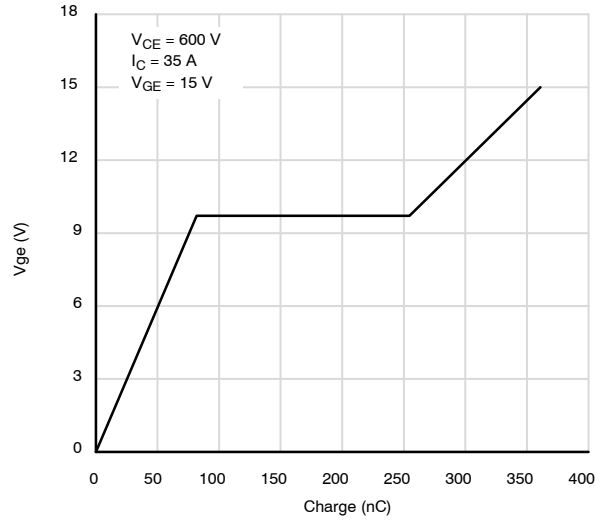


Figure 9. Gate Voltage vs. Gate Charge

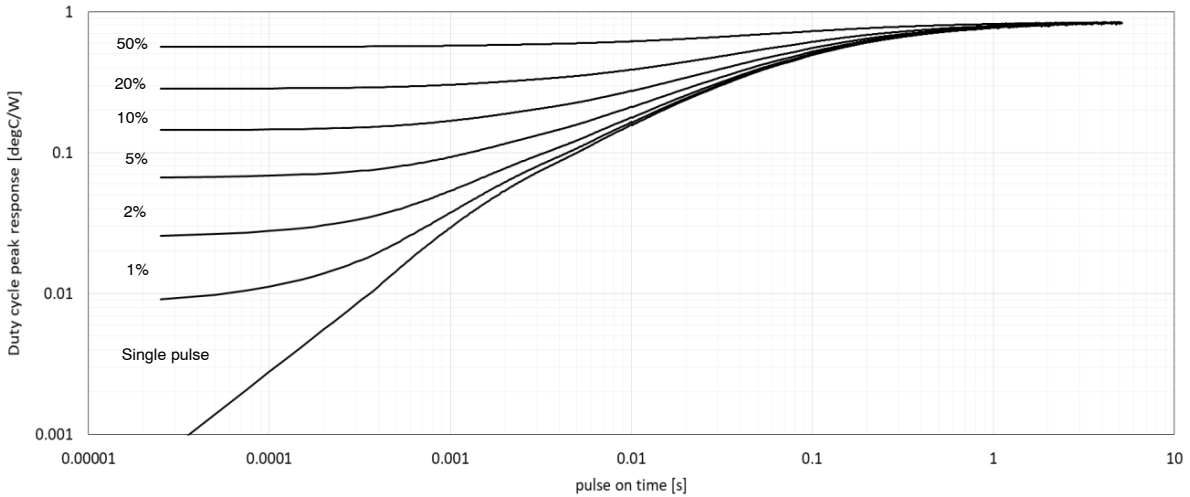


Figure 10. IGBT Junction-to-Heatsink Transient Thermal Impedance

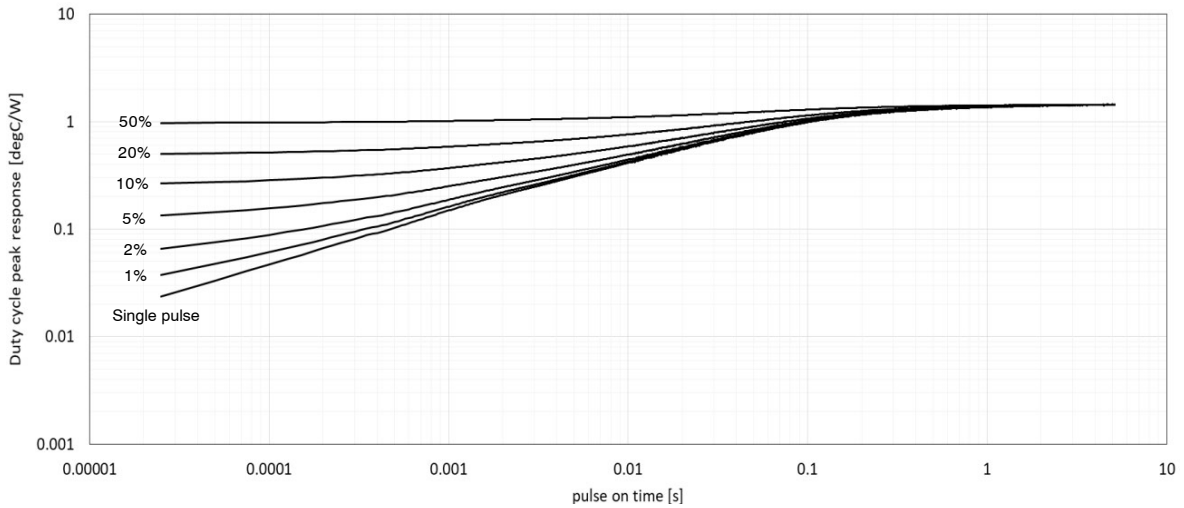


Figure 11. Diode Junction-to-Heatsink Transient Thermal Impedance

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TYPICAL CHARACTERISTICS – RECTIFIER

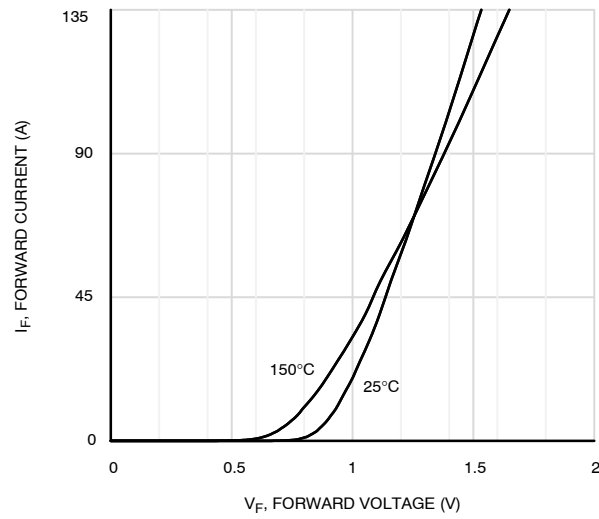


Figure 12. Rectifier Typical Forward Characteristic

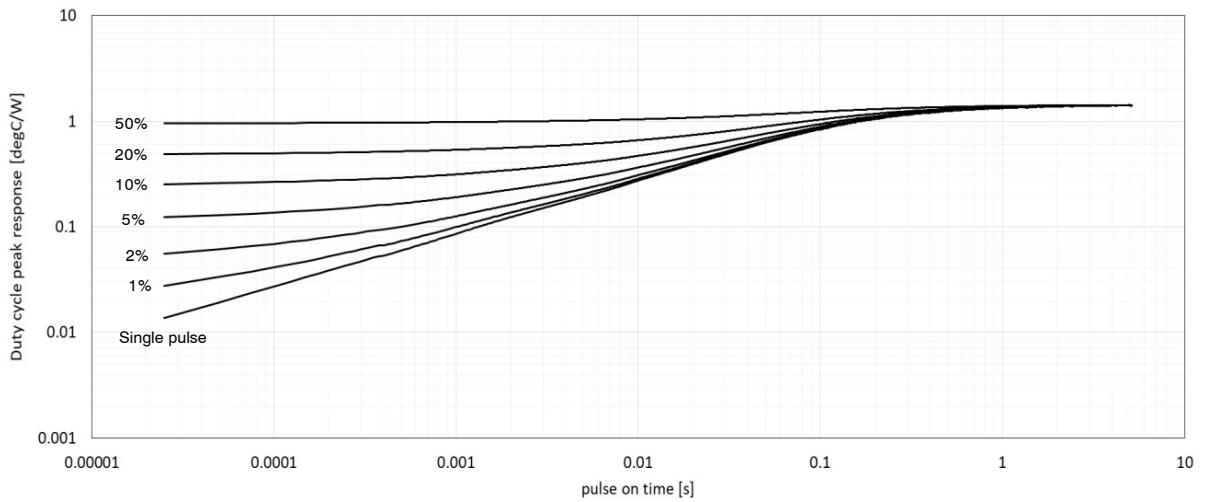
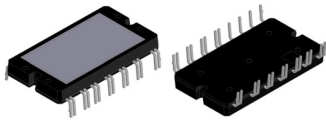


Figure 13. Rectifier Junction-to-Heatsink Transient Thermal Impedance

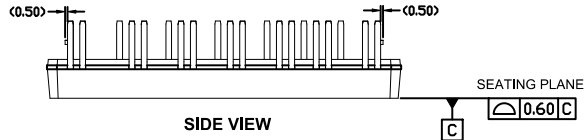
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

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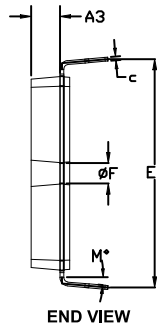
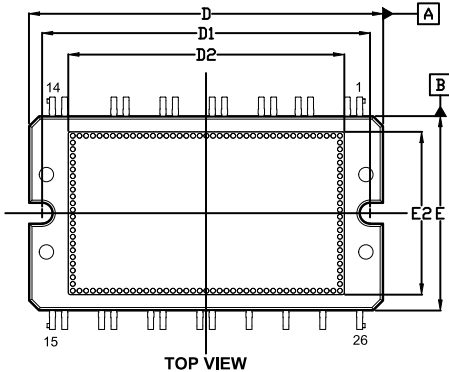
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CASE 181AD
ISSUE B

DATE 05 AUG 2021

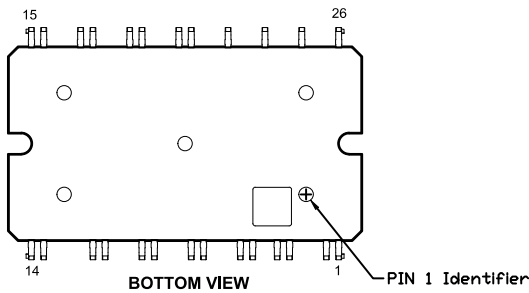
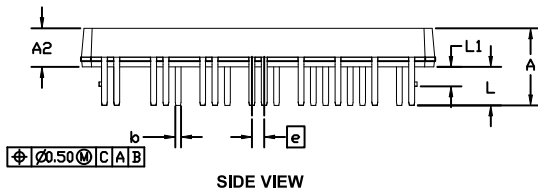


NOTES:

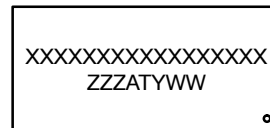
1. Dimensioning and tolerancing as per ASME Y14.5M, 2009
2. Controlling Dimension: Millimeters
3. Dimensions are exclusive of Burrs, Mold Flash, and Tiebar extrusions
4. Dimensions "b" and "c" apply to plated leads
5. Position of the leads is determine at the root of the lead where it exits the package body



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	15.50	16.00	16.50
A2	7.80	8.00	8.20
A3	6.00 REF		
b	1.10	1.20	1.30
c	0.70	0.80	0.90
D	72.70	73.20	73.70
D1	67.30	67.80	68.30
D2	57.30 REF		
E	39.70	40.20	40.70
E1	46.70	47.20	47.70
E2	33.87 REF		
e	2.54 BSC		
F	4.00	4.20	4.40
L	8.00 REF		
L1	3.50	4.00	4.50
M	4°	5°	6°



GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
ZZZ = Assembly Lot Code
AT = Assembly & Test Location
Y = Year
WW = Work Week

*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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