

TMPIM 25 A CIB Module

NXH25C120L2C2SG

The NXH25C120L2C2SG is a transfer-molded power module containing a converter-inverter-brake circuit consisting of six 25 A, 1600 V rectifiers, six 25 A, 1200 V IGBTs with inverse diodes, one 25 A, 1200 V brake IGBT with brake diode and an NTC thermistor.

Features

- 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

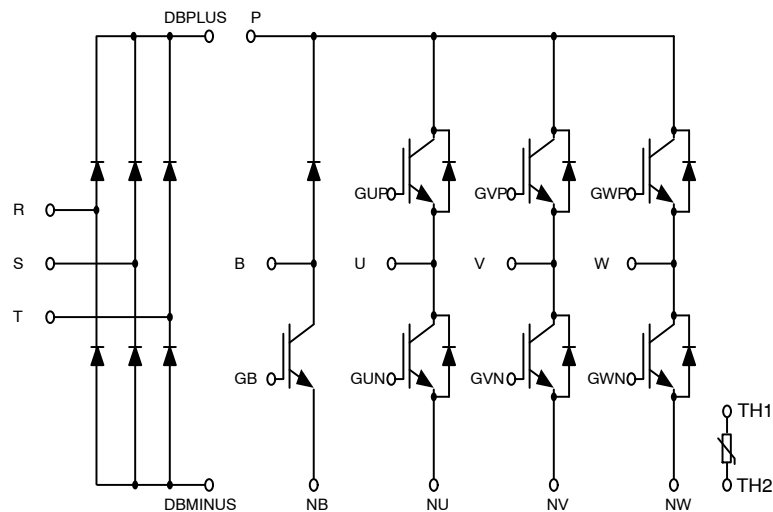
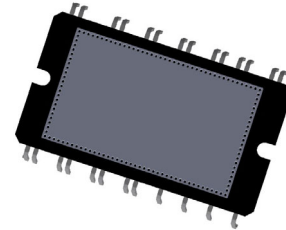


Figure 1. NXH25C120L2C2SG Schematic Diagram



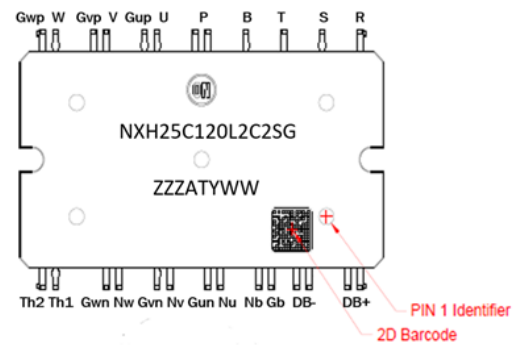
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DIP26 67.8x40
CASE 181AD

MARKING DIAGRAM



NXH25C120L2C2SG = Specific Device Code
 ZZZ = Assembly Lot Code
 AT = Assembly & Test Location
 Y = Year
 WW = Work Week

ORDERING INFORMATION

| Device | Package | Shipping† |
|-----------------|--------------------|-------------------|
| NXH25C120L2C2SG | DIP26 (Pb-Free) | 6 Units / Tube |

NXH25C120L2C2SG

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------|--------|-------|------|
|--------|--------|-------|------|

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 | 25 | A |
| Pulsed Collector Current | I_{Cpulse} | 75 | 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 | 25 | A |
| Repetitive Peak Forward Current | I_{FRM} | 75 | 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 | 25 | A |
| Repetitive Peak Forward Current | I_{FRM} | 75 | A |
| I^2t value (10 ms single half–sine wave) @ 25°C (10 ms single half–sine wave) @ 150°C | I^2t | 680 360 | A^2t |
| Surge current (10 ms sin180°) @ 25°C | IFSM | 370 | A |

THERMAL PROPERTIES

| | | | |
|---------------------------|-----------|------------|----|
| Storage Temperature range | T_{stg} | –40 to 125 | °C |
|---------------------------|-----------|------------|----|

INSULATION PROPERTIES

| | | | |
|--|----------|-------------------------|-----------|
| Isolation test voltage, t = 1 sec, 50 Hz | V_{is} | 3000 | V_{RMS} |
| Internal isolation | | Al_2O_3 | |
| 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.

NXH25C120L2C2SG

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 = 25 A, T _J = 25°C | V _{CE(sat)} | – | 1.7 | 2.4 | V | |
| | V _{GE} = 15 V, I _C = 25 A, T _J = 150°C | | – | 1.9 | – | | |
| Gate–Emitter Threshold Voltage | V _{GE} = V _{CE} , I _C = 3.04 mA | V _{GE(TH)} | 4.8 | 5.9 | 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 = 25 A V _{GE} = ±15 V, R _G = 20 Ω | t _{d(on)} | – | 68 | – | ns | |
| Rise Time | | t _r | – | 63 | – | | |
| Turn-off Delay Time | | t _{d(off)} | – | 235 | – | | |
| Fall Time | | t _f | – | 48 | – | | |
| Turn-on Switching Loss per Pulse | | E _{on} | – | 2200 | – | | μJ |
| Turn off Switching Loss per Pulse | | E _{off} | – | 720 | – | | |
| Turn-on Delay Time | T _J = 125°C V _{CE} = 600 V, I _C = 25 A V _{GE} = ±15 V, R _G = 20 Ω | t _{d(on)} | – | 72 | – | ns | |
| Rise Time | | t _r | – | 56 | – | | |
| Turn-off Delay Time | | t _{d(off)} | – | 266 | – | | |
| Fall Time | | t _f | – | 54 | – | | |
| Turn-on Switching Loss per Pulse | | E _{on} | – | 3050 | – | | μJ |
| Turn off Switching Loss per Pulse | | E _{off} | – | 1200 | – | | |
| Input Capacitance | V _{CE} = 20 V, V _{GE} = 0 V f = 100 kHz | C _{ies} | – | 6200 | – | pF | |
| Output Capacitance | | C _{oes} | – | 212 | – | | |
| Reverse Transfer Capacitance | | C _{res} | – | 117 | – | | |
| Total Gate Charge | V _{CE} = 600 V, I _C = 25 A, V _{GE} = 0 V ~ +15 V | Q _g | – | 269 | – | nC | |
| Temperature under switching conditions | | T _{vj op} | –40 | | 150 | °C | |
| Thermal Resistance – chip-to-case | | R _{thJC} | – | 0.54 | – | °C/W | |

DIODE CHARACTERISTICS

| | | | | | | |
|--|---|--------------------|-----|------|-----|------|
| Brake Diode Reverse Leakage Current | V _R = 1200 V | I _R | – | – | 200 | μA |
| Diode Forward Voltage | I _F = 25 A, T _J = 25°C | V _F | – | 1.9 | 2.6 | V |
| | I _F = 25 A, T _J = 150°C | | – | 1.7 | – | |
| Reverse Recovery Charge | T _J = 25°C V _{CE} = 600 V, I _C = 25 A V _{GE} = ±15 V, R _G = 20 Ω | Q _{rr} | – | 1.35 | – | μC |
| Peak Reverse Recovery Current | | I _{RPM} | – | 16 | – | A |
| Reverse Recovery Energy | | E _{rr} | – | 350 | – | μJ |
| Reverse Recovery Charge | T _J = 150 °C V _{CE} = 600 V, I _C = 25 A V _{GE} = ±15 V, R _G = 20 Ω | Q _{rr} | – | 3.6 | – | μC |
| Peak Reverse Recovery Current | | I _{RPM} | – | 26 | – | A |
| Reverse Recovery Energy | | E _{rr} | – | 1050 | – | μJ |
| Temperature under switching conditions | | T _{vj op} | –40 | | 150 | °C |
| Thermal Resistance – chip-to-case | | R _{thJC} | – | 1.10 | – | °C/W |

NXH25C120L2C2SG

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 | $I_F = 25\text{ A}, T_J = 25^\circ\text{C}$ | V_F | – | 1 | 1.5 | V |
| | $I_F = 35\text{ A}, T_J = 150^\circ\text{C}$ | | – | 1.1 | – | |
| Temperature under switching conditions | | $T_{vj\text{ op}}$ | –40 | | 150 | $^\circ\text{C}$ |
| Thermal Resistance – chip-to-case | | R_{thJC} | – | 0.86 | – | $^\circ\text{C/W}$ |

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

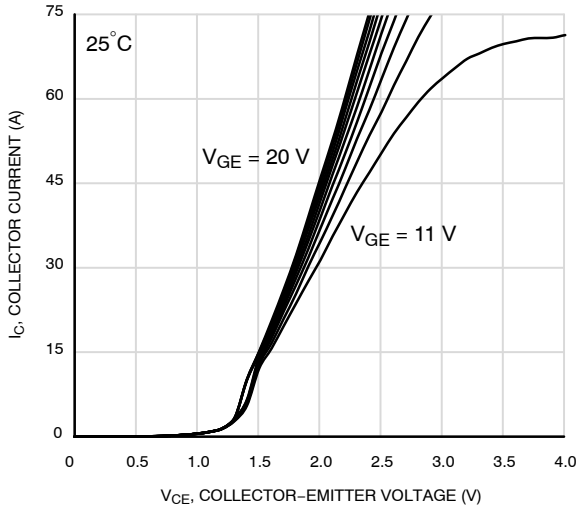


Figure 2. Inverter IGBT Typical Output Characteristic (25°C)

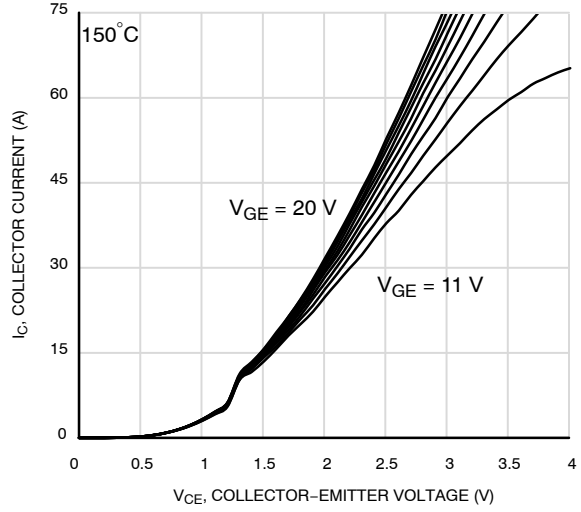


Figure 3. Inverter IGBT Typical Output Characteristic (150°C)

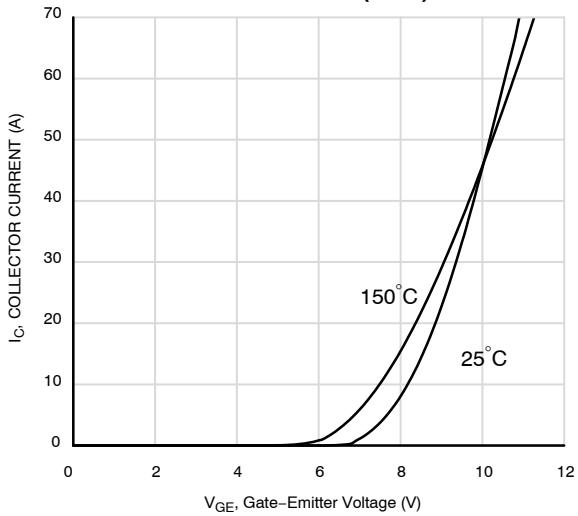


Figure 4. Inverter IGBT Typical Transfer Characteristic

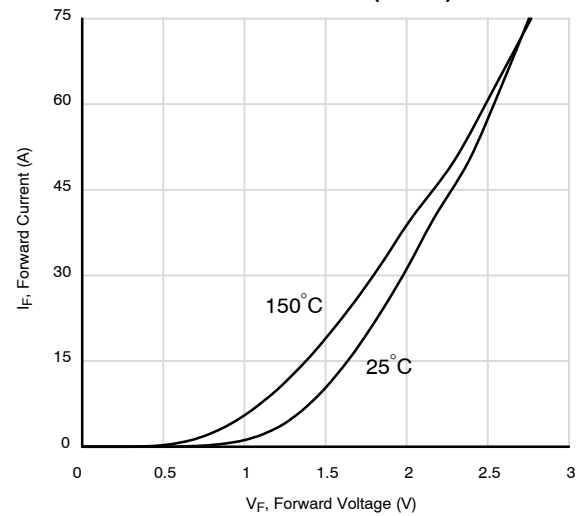


Figure 5. Inverter Diode Typical Forward Characteristic

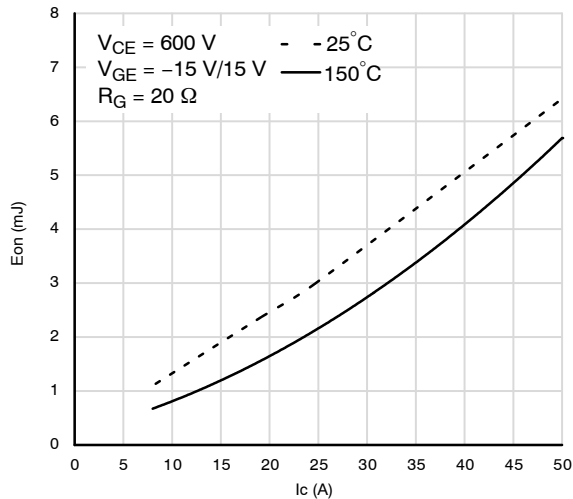


Figure 6. Inverter IGBT Typical Turn On Loss vs Ic

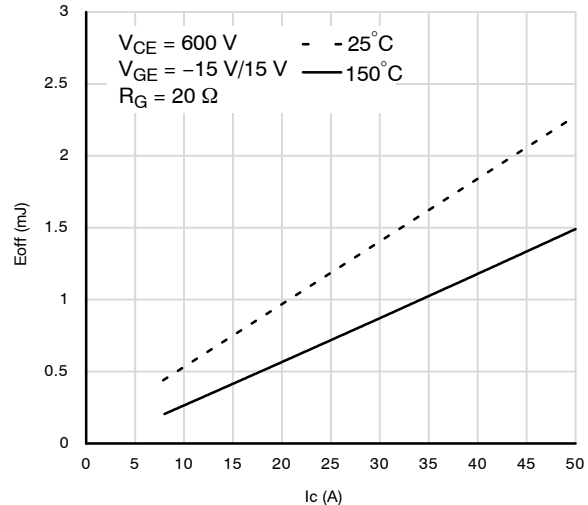


Figure 7. Inverter IGBT Typical Turn Off Loss vs Ic

TYPICAL CHARACTERISTICS – INVERTER/BRAKE IGBT & DIODE

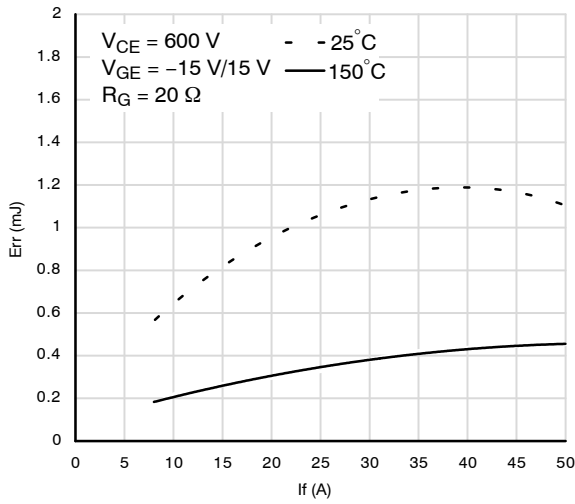


Figure 8. Inverter Diode Typical Reverse Recovery Energy vs IC

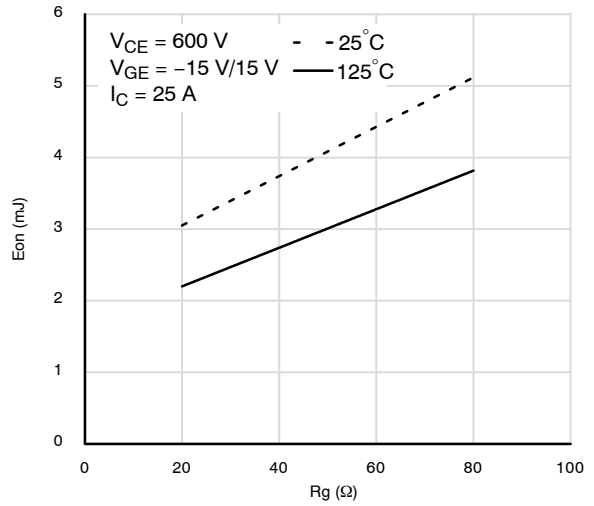


Figure 9. Inverter IGBT Typical Turn On Loss vs RG

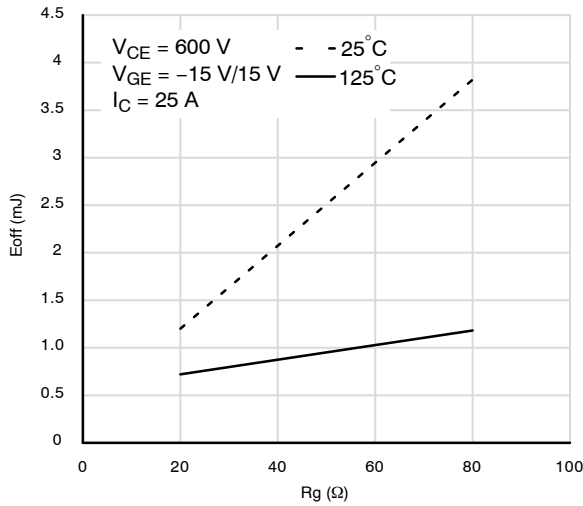


Figure 10. Inverter IGBT Typical Turn Off Loss vs RG

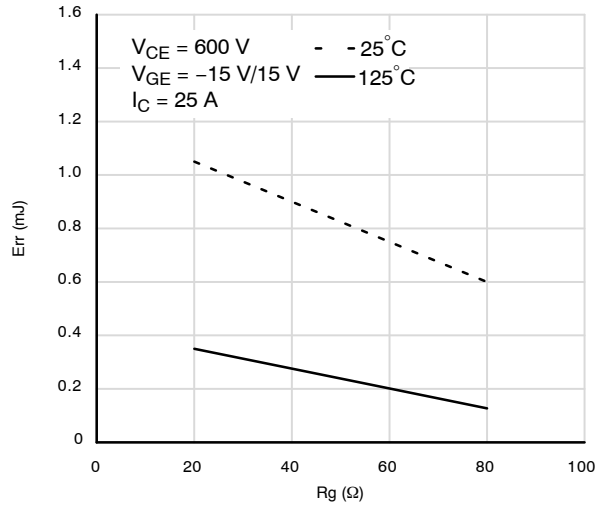


Figure 11. Inverter Diode Typical Reverse Recovery Energy vs RG

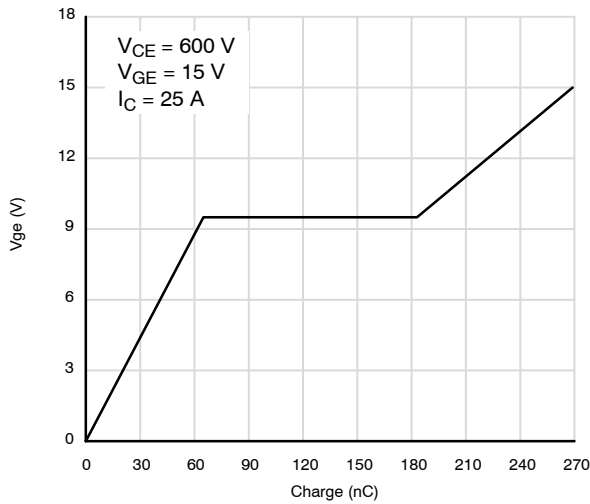


Figure 12. Inverter IGBT Gate Voltage vs Gate Charge

NXH25C120L2C2SG

TYPICAL CHARACTERISTICS – INVERTER/BRAKE IGBT & DIODE

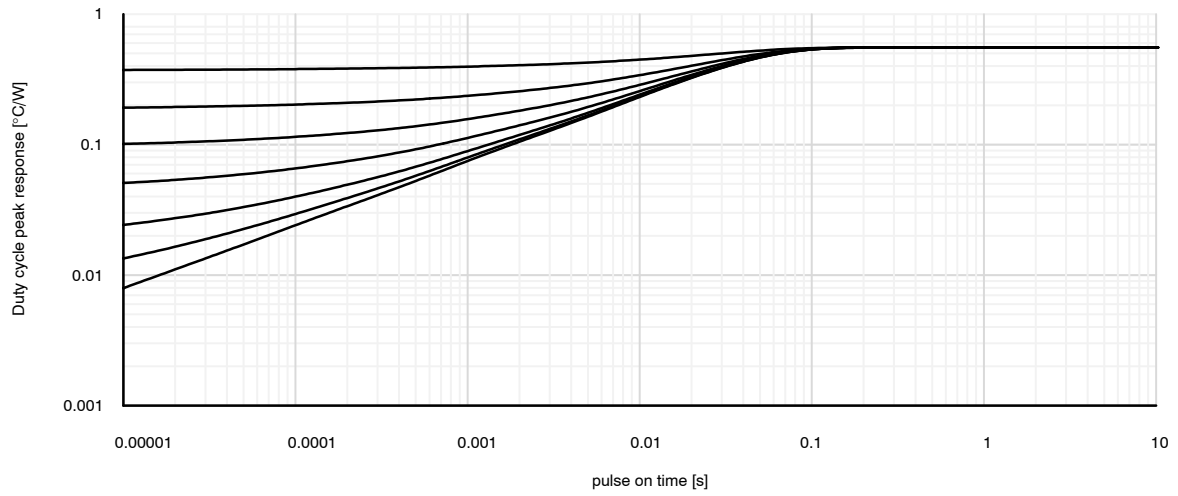


Figure 13. IGBT Junction-to-Case Transient Thermal Impedance

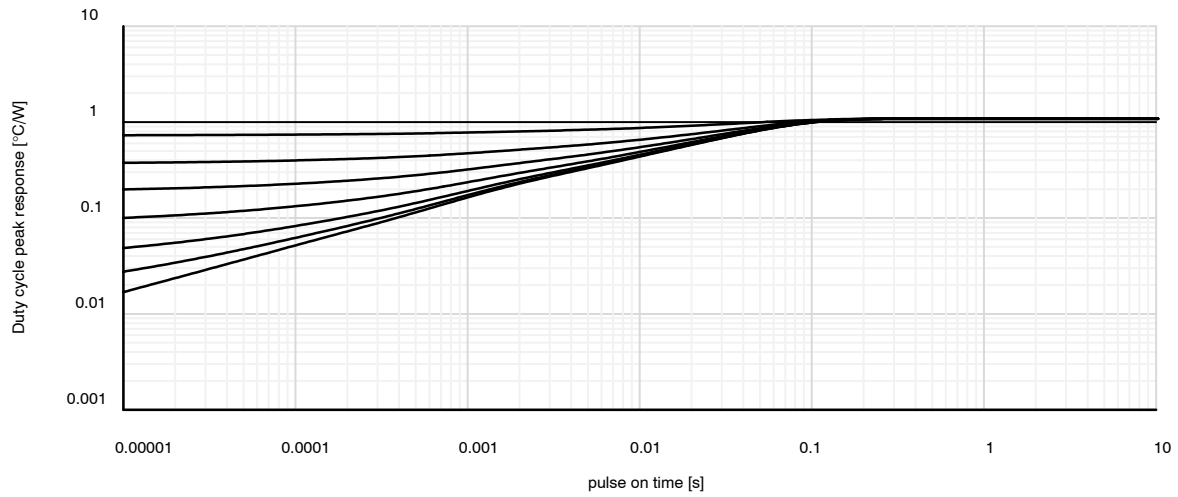


Figure 14. Diode Junction-to-Case Transient Thermal Impedance

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TYPICAL CHARACTERISTICS – RECTIFIER

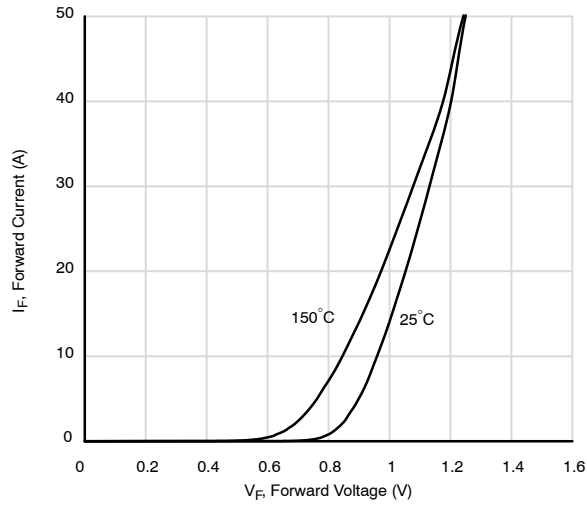


Figure 15. Rectifier Typical Forward Characteristic

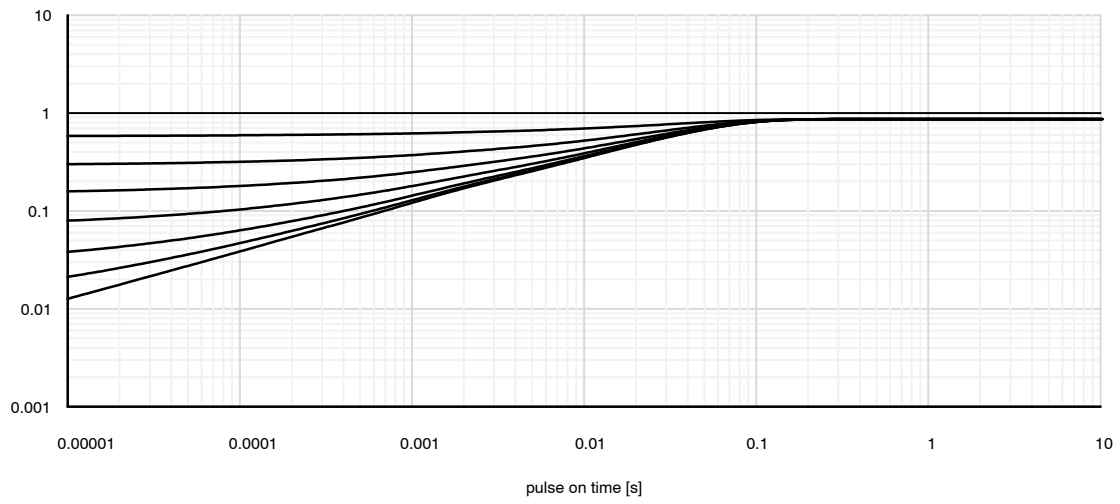
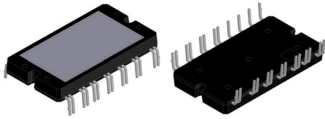


Figure 16. Rectifier Junction-to-Case Transient Thermal Impedance

MECHANICAL CASE OUTLINE

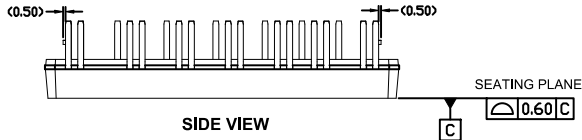
PACKAGE DIMENSIONS

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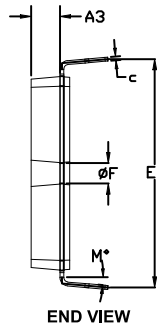
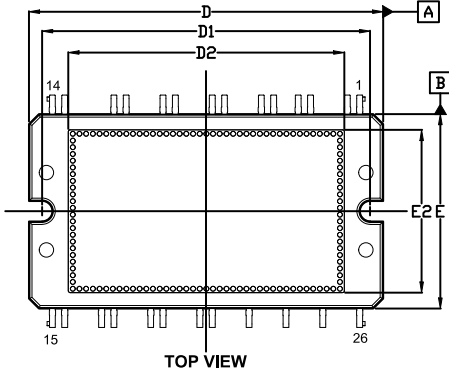
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ISSUE B

DATE 05 AUG 2021

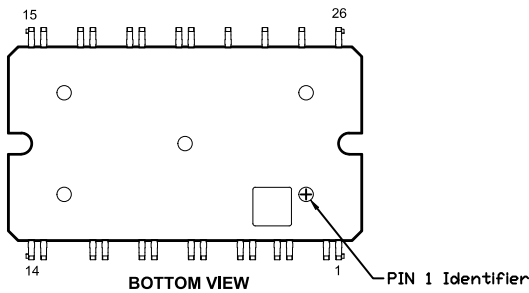
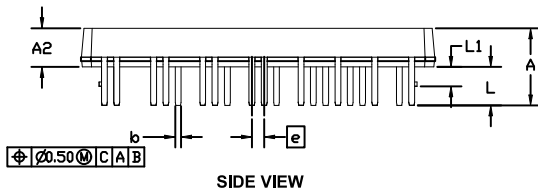


NOTES:

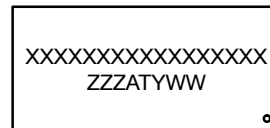
1. Dimensioning and tolerancing as per ASME Y14.5M, 2009
2. Controlling Dimension: Millimeters
3. Dimensions are exclusive of Burrs, Mold Flash, and Tiebar extrusions
4. Dimensions "b" and "c" apply to plated leads
5. Position of the leads is determine at the root of the lead where it exits the package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