

TMPIM 35 A CIB/CI Module

Product Preview

NXH35C120L2C2SG/S1G

The NXH35C120L2C2SG is a transfer-molded power module 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.

The NXH35C120L2C2S1G is a transfer-molded power module containing a converter-inverter circuit consisting of six 35 A, 1600 V rectifiers, six 35 A, 1200 V IGBTs with inverse diodes, and an NTC thermistor.

Features

- Low Thermal Resistance
- 6 mm Clearance Distance from 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

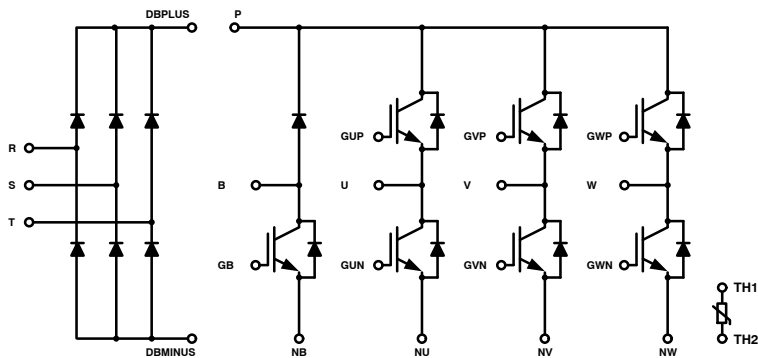


Figure 1. NXH35C120L2C2SG Schematic Diagram

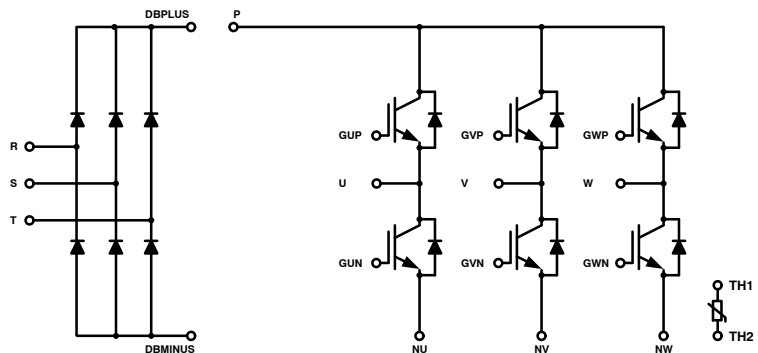
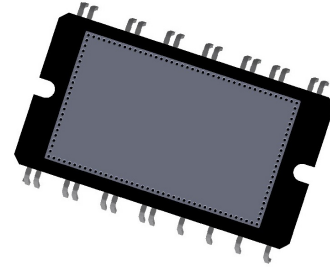


Figure 2. NXH35C120L2C2S1G Schematic Diagram



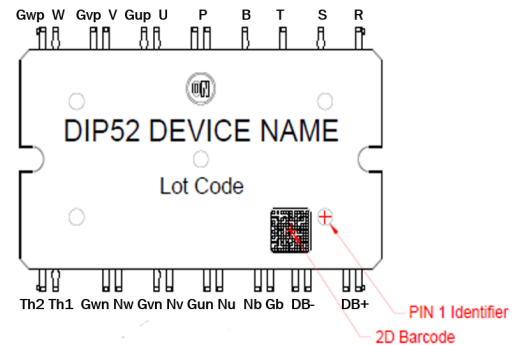
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TMPIM DIP52
CASE 181AD

MARKING DIAGRAM



ORDERING INFORMATION

| Device | Package | Shipping |
|------------------|-----------------------------|-------------------|
| NXH35C120L2C2SG | TMPIM DIP52 (Pb-Free) | 6 Units / Tube |
| NXH35C120L2C2S1G | TMPIM DIP52 (Pb-Free) | 6 Units / Tube |

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

NXH35C120L2C2SG/S1G

MAXIMUM RATINGS (Note 1)

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

IGBT

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

DIODE

| | | | |
|---|-----------|------|--------|
| Peak Repetitive Reverse Voltage | V_{RRM} | 1200 | V |
| Continuous Forward Current @ $T_c = 80^\circ\text{C}$ ($T_{VJmax} = 175^\circ\text{C}$) | I_F | 35 | A |
| Repetitive Peak Forward Current ($T_J = 175^\circ\text{C}$) | I_{FRM} | 105 | A |
| I^2t Value (60 Hz single half–sine wave) | I^2t | 46 | A^2t |

RECTIFIER DIODE

| | | | |
|---|-----------|-------------|--------|
| Peak Repetitive Reverse Voltage | V_{RRM} | 1600 | V |
| Continuous Forward Current @ $T_c = 80^\circ\text{C}$ ($T_{VJmax} = 150^\circ\text{C}$) | I_F | 35 | A |
| Repetitive Peak Forward Current ($T_J = 150^\circ\text{C}$) | I_{FRM} | 105 | A |
| I^2t Value (60 Hz single half–sine wave) @ 25°C (60 Hz single half–sine wave) @ 150°C | I^2t | 1126 510 | A^2t |
| Surge Current (10 ms sin180°) @ 25°C | I_{FSM} | 520 | A |

THERMAL PROPERTIES

| | | | |
|---------------------------|-----------|-------------|------------------|
| Storage Temperature Range | T_{stg} | –40 to +125 | $^\circ\text{C}$ |
|---------------------------|-----------|-------------|------------------|

INSULATION PROPERTIES

| | | | |
|--|----------|-------|-----------|
| Isolation Test Voltage, $t = 1$ s, 50 Hz | V_{is} | 3000 | V_{RMS} |
| Internal Isolation | | Al2O3 | |
| 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.

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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–Case | | R _{thJC} | – | 0.57 | – | °C/W | |
| Thermal Resistance – Chip–to–Heatsink | Thermal grease, Thickness ≈ 3 mil, λ = 2.8 W/mK | R _{thJH} | – | 0.97 | – | °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 _{RPM} | – | 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 _{RPM} | – | 30 | – | A |
| Reverse Recovery Energy | | E _{rr} | – | 1983 | – | μJ |
| Temperature under Switching Conditions | | T _{vj op} | –40 | – | 150 | °C |
| Thermal Resistance – Chip–to–Case | | R _{thJC} | – | 0.94 | – | °C/W |
| Thermal Resistance – Chip–to–Heatsink | Thermal grease, Thickness ≈ 3 mil, λ = 2.8 W/mK | R _{thJH} | – | 1.5 | – | °C/W |

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

| Parameter | Test Conditions | Symbol | Min | Typ | Max | Unit |
|-----------|-----------------|--------|-----|-----|-----|------|
|-----------|-----------------|--------|-----|-----|-----|------|

RECTIFIER DIODE CHARACTERISTICS

| | | | | | | |
|--|--|--------------------|-----|------|-----|------|
| Rectifier Reverse Leakage Current | V _R = 1600 V | I _R | – | – | 200 | μA |
| Rectifier Forward Voltage | I _F = 35 A, T _J = 25°C | V _F | – | 1.1 | 1.5 | V |
| | I _F = 35 A, T _J = 150°C | | – | 1 | – | |
| Temperature under Switching Conditions | | T _{vj op} | –40 | – | 150 | °C |
| Thermal Resistance – Chip-to-Case | | R _{thJC} | – | 0.55 | – | °C/W |
| Thermal Resistance – Chip-to-Heatsink | Thermal grease, Thickness ≈ 3 mil, λ = 2.8 W/mK | R _{thJH} | – | 1.28 | – | °C/W |

THERMISTOR CHARACTERISTICS

| | | | | | | |
|----------------------------|--------------------------|------------------|----|-------|---|------|
| Nominal Resistance | T = 25°C | R ₂₅ | – | 5 | – | kΩ |
| Nominal Resistance | T = 100°C | R ₁₀₀ | – | 493.3 | – | Ω |
| Deviation of R25 | | ΔR/R | –5 | – | 5 | % |
| Power Dissipation | | P _D | – | 20 | – | mW |
| Power Dissipation Constant | | | – | 1.4 | – | mW/K |
| B-value | B(25/50), tolerance ±2% | | – | 3375 | – | K |
| B-value | B(25/100), tolerance ±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

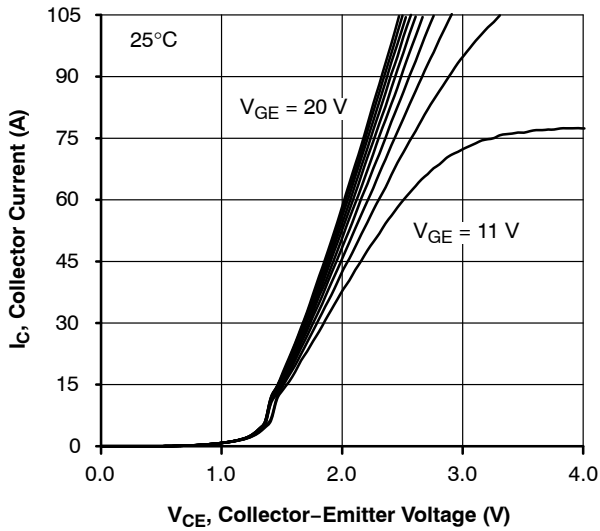


Figure 3. IGBT Typical Output Characteristic

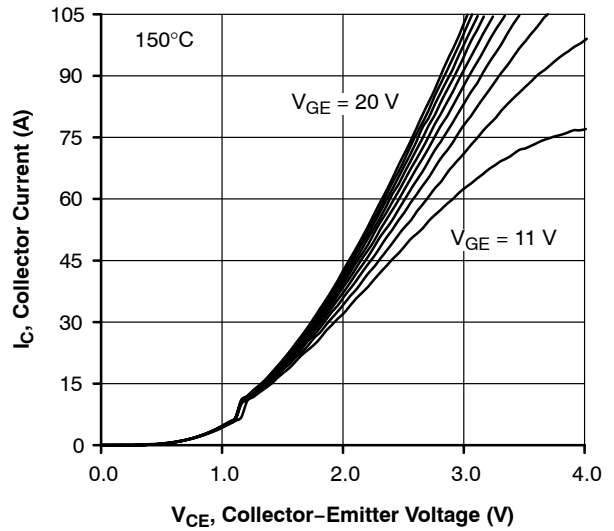


Figure 4. IGBT Typical Output Characteristic

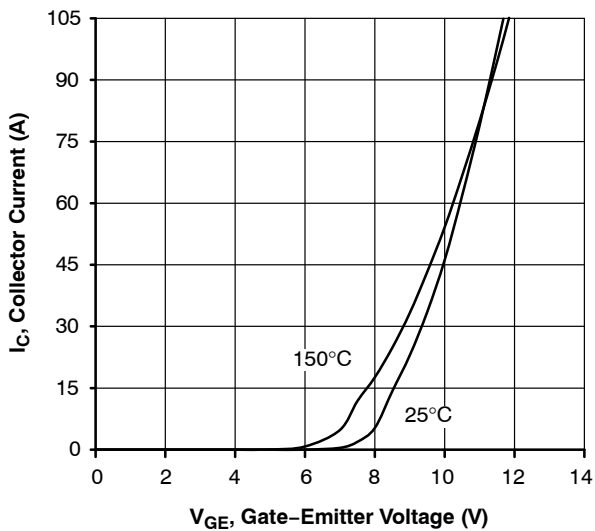


Figure 5. IGBT Typical Transfer Characteristic

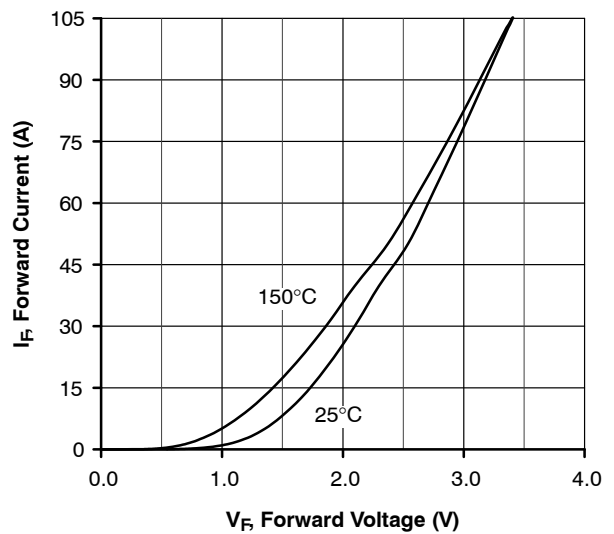


Figure 6. Diode Typical Forward Characteristic

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TYPICAL CHARACTERISTICS – INVERTER/BRAKE IGBT & DIODE (Continued)

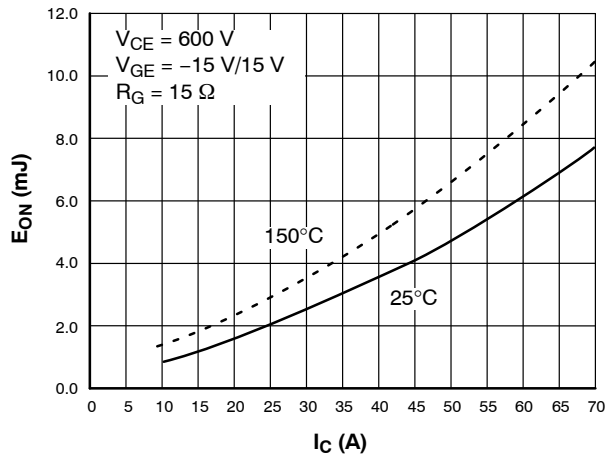


Figure 7. Typical Turn On Loss vs I_C

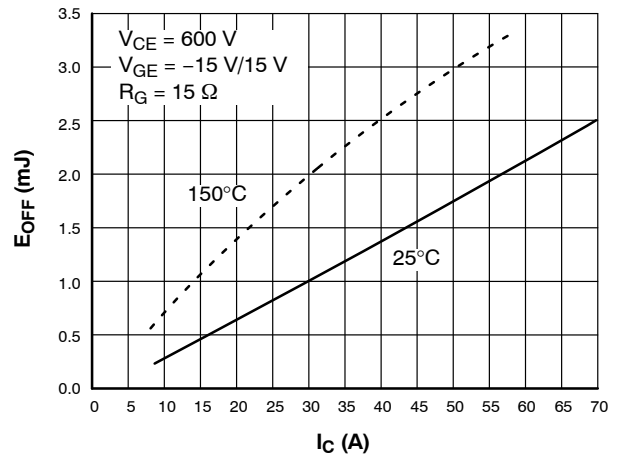


Figure 8. Typical Turn Off Loss vs I_C

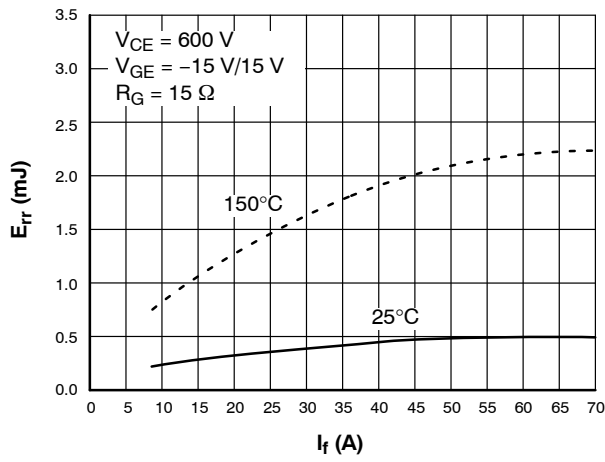


Figure 9. Typical Reverse Recovery Energy vs I_C

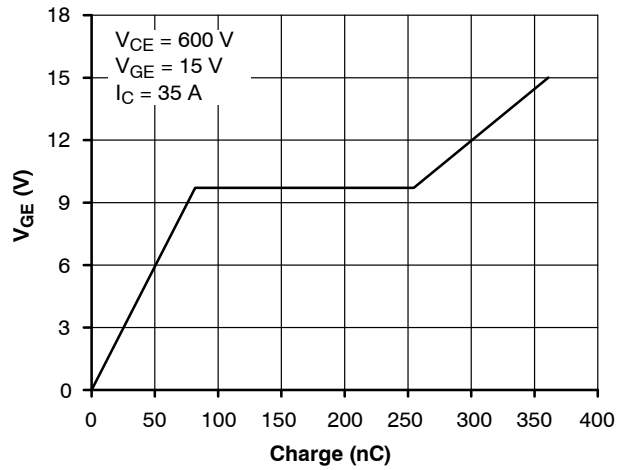


Figure 10. Gate Voltage vs. Gate Charge

NXH35C120L2C2SG/S1G

TYPICAL CHARACTERISTICS – INVERTER/BRAKE IGBT & DIODE (Continued)

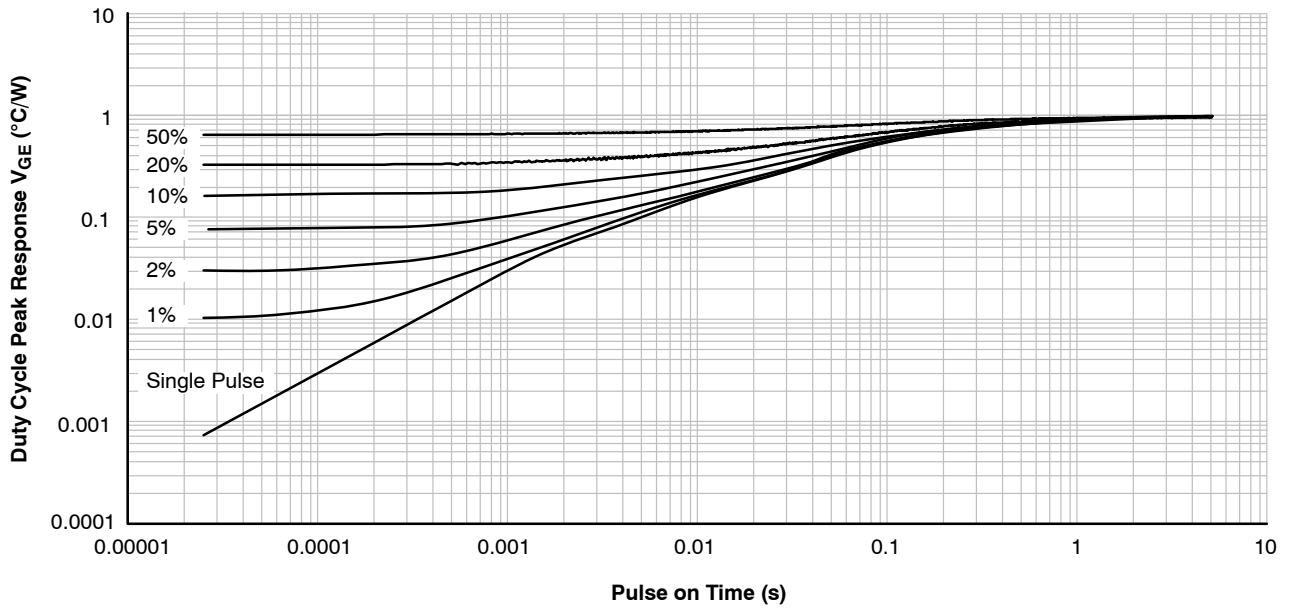


Figure 11. IGBT Junction-to-Heatsink Transient Thermal Impedance

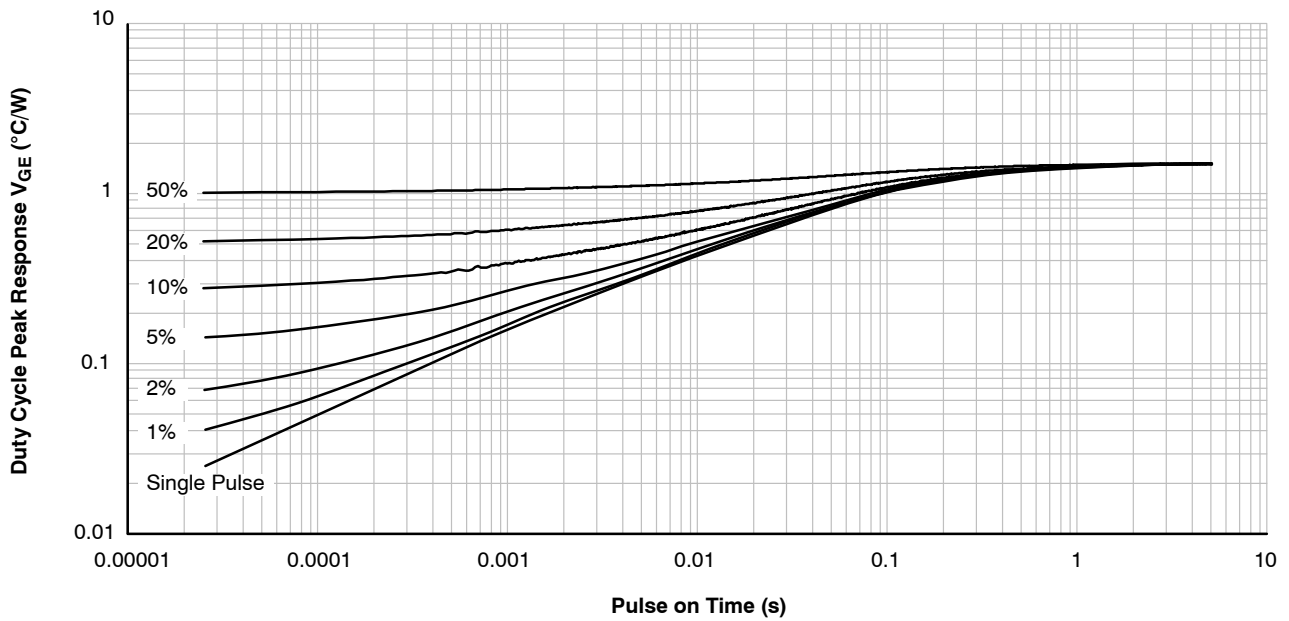


Figure 12. Diode Junction-to-Heatsink Transient Thermal Impedance

NXH35C120L2C2SG/S1G

TYPICAL CHARACTERISTICS – RECTIFIER

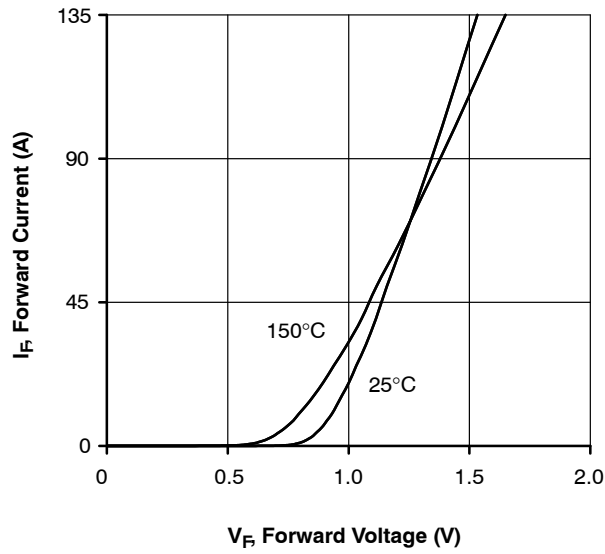


Figure 13. Rectifier Typical Forward Characteristic

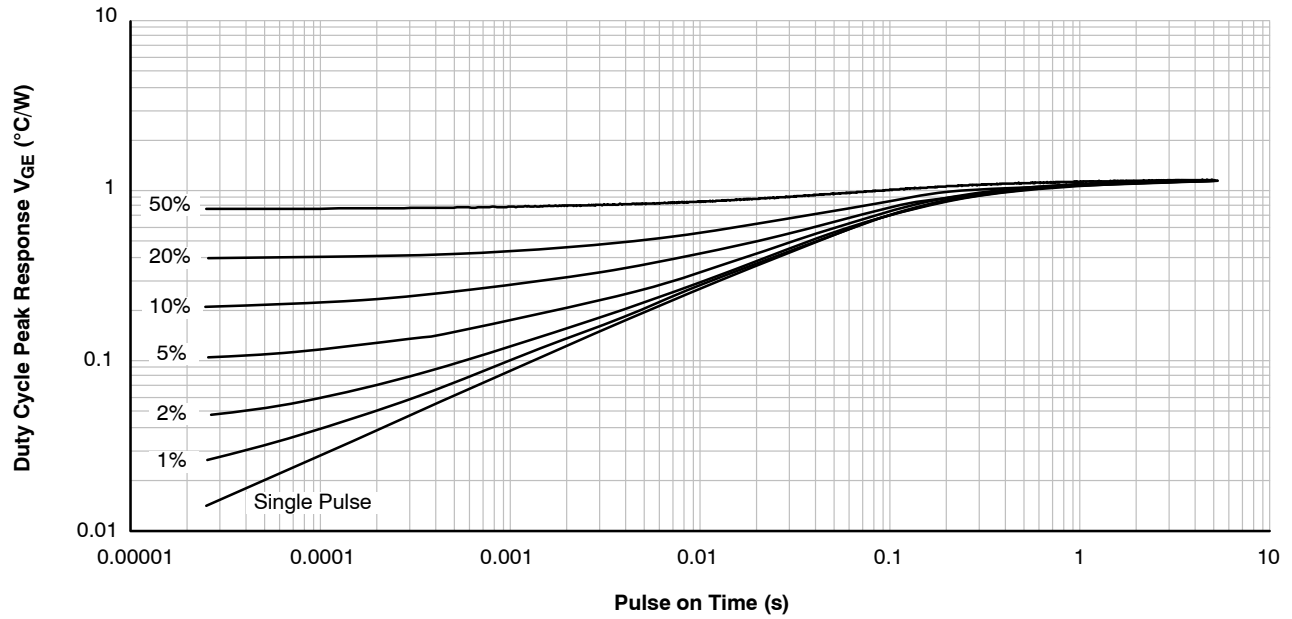
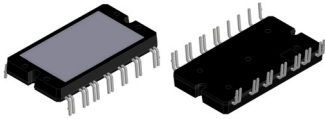


Figure 14. Rectifier Junction-to-Heatsink Transient Thermal Impedance

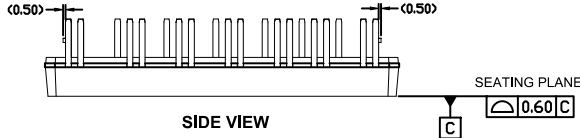
MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS



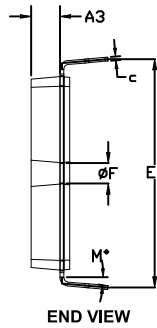
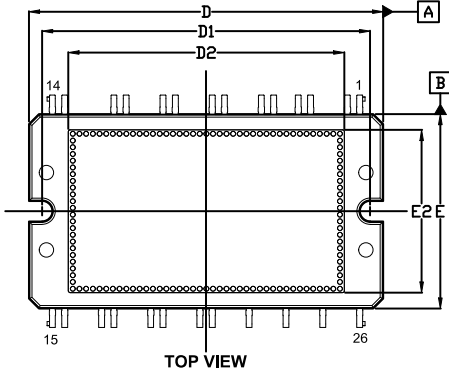
DIP26 67.8x40
CASE 181AD
ISSUE B

DATE 05 AUG 2021

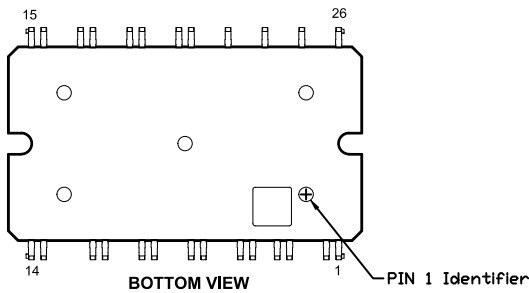
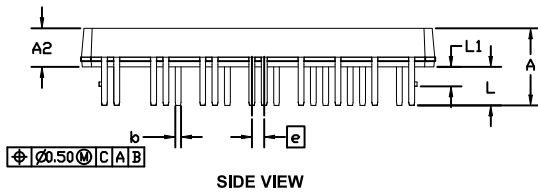


NOTES:

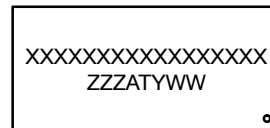
1. Dimensioning and tolerancing as per ASME Y14.5M, 2009
2. Controlling Dimension: Millimeters
3. Dimensions are exclusive of Burrs, Mold Flash, and Tiebar extrusions
4. Dimensions "b" and "c" apply to plated leads
5. Position of the leads is determine at the root of the lead where it exits the package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