

NCE10G120

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1200V, 10A, Trench NPT IGBT

Features

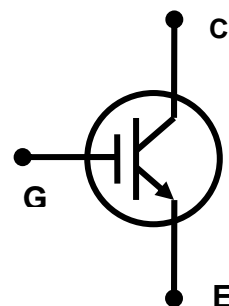
- Trench NPT(Non Punch Through) IGBT
- High speed switching
- Low saturation voltage: $V_{CE(sat)}=2.0V@I_C=10A$
- High input impedance



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Applications

- Inductive heating, Microwave oven, Inverter, UPS, etc.
- Soft switching applications



General Description

Using advanced Trench NPT technology, NCE's 1200V IGBTs offers superior conduction and switching performances, and easy parallel operation with exceptional avalanche ruggedness. This device is designed for soft switching applications.

Absolute Maximum Ratings

| Symbol | Description | Ratings | Units |
|-------------|--|-------------|-------------|
| V_{CES} | Collector to Emitter Voltage | 1200 | V |
| V_{GES} | Gate to Emitter Voltage | +/-25 | V |
| I_C | Continuous Collector Current @ $T_C=25^{\circ}C$ | 16 | A |
| | Continuous Collector Current @ $T_C=100^{\circ}C$ | 10 | A |
| $I_{CM(1)}$ | Pulsed Collector Current | 24 | A |
| P_D | Maximum Power Dissipation @ $T_C=25^{\circ}C$ | 138 | W |
| T_J | Operating Junction Temperature | -55 to +150 | $^{\circ}C$ |
| T_{stg} | Storage Temperature Range | -55 to +150 | $^{\circ}C$ |
| T_L | Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5seconds | 260 | $^{\circ}C$ |

Notes:

1. Repetitive rating, Pulse width limited by max. junction temperature

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Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|------------------|---|------|------|-------|
| R _{θJC} | Thermal Resistance, Junction to Case | - | 0.9 | °C/W |
| R _{θJA} | Thermal Resistance, Junction to Ambient | - | 62 | °C/W |

Electrical Characteristics of the IGBT T_C=25°C

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|----------------------------------|---|--|---|------|--------|-------|
| Off Characteristics | | | | | | |
| BV _{CES} | Collector to Emitter Breakdown Voltage | V _{GE} =0V, I _C =1mA | 1200 | - | - | V |
| I _{CES} | Collector Cut-Off Current | V _{CE} =V _{CES} , V _{GE} =0V | - | - | 1 | mA |
| I _{GES} | G-E Leakage Current | V _{GE} =V _{GES} , V _{CE} =0V | - | - | +/-250 | nA |
| On Characteristics | | | | | | |
| V _{GE(th)} | G-E Threshold Voltage | I _C =10mA, V _{CE} =V _{GE} | 4.0 | 5.5 | 7.0 | V |
| V _{CE(sat)} | Collector to Emitter Saturation Voltage | I _C =10A, V _{GE} =15V T _C =25°C | - | 2 | 2.5 | V |
| | | I _C =10A, V _{GE} =15V T _C =125°C | - | 2.15 | - | V |
| Dynamic Characteristics | | | | | | |
| C _{ies} | Input Capacitance | V _{CE} =30V, V _{GE} =0V, f=1MHz | - | 606 | - | pF |
| C _{oes} | Output Capacitance | | - | 48 | - | pF |
| C _{res} | Reverse Transfer Capacitance | | - | 29 | - | pF |
| Switching Characteristics | | | | | | |
| t _{d(on)} | Turn-On Delay Time | V _{CC} =600V, I _C =10A, R _G =10Ω, V _{GE} =15V, Resistive Load, T _C =25°C | - | 45 | - | ns |
| t _r | Rise Time | | - | 20 | - | ns |
| t _{d(off)} | Turn-Off Delay Time | | - | 520 | - | ns |
| t _f | Fall Time | | - | 80 | - | ns |
| E _{on} | Turn-On Switching Loss | | - | 0.68 | - | mJ |
| E _{off} | Turn-Off Switching Loss | | - | 0.78 | - | mJ |
| E _{ts} | Total Switching Loss | | - | 1.46 | - | mJ |
| t _{d(on)} | Turn-On Delay Time | | V _{CC} =600V, I _C =10A, R _G =10Ω, V _{GE} =15V, Resistive Load, T _C =125°C | - | 45 | - |
| t _r | Rise Time | - | | 24 | - | ns |
| t _{d(off)} | Turn-Off Delay Time | - | | 592 | - | ns |
| t _f | Fall Time | - | | 177 | - | ns |
| E _{on} | Turn-On Switching Loss | - | | 0.83 | - | mJ |
| E _{off} | Turn-Off Switching Loss | - | | 1.19 | - | mJ |
| E _{ts} | Total Switching Loss | - | | 2.02 | - | mJ |

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Typical Performance Characteristics

Figure 1. Typical Output Characteristics

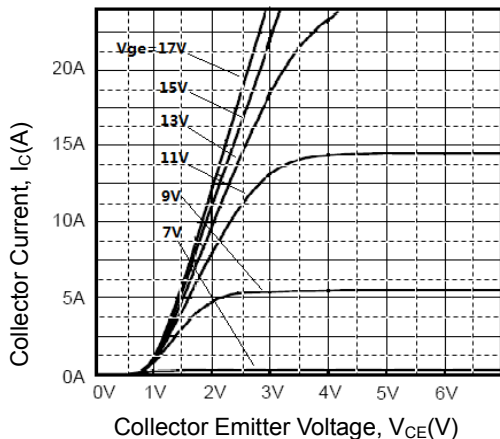


Figure 2. Typical Saturation Voltage Characteristics

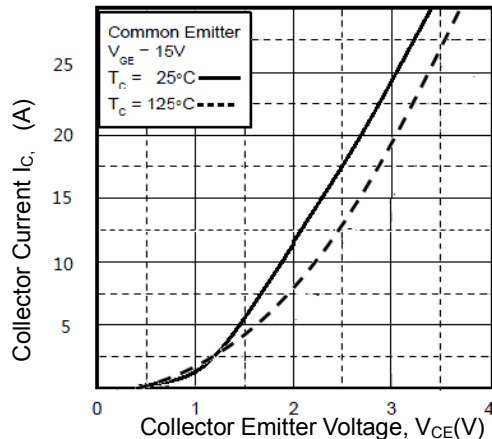


Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level

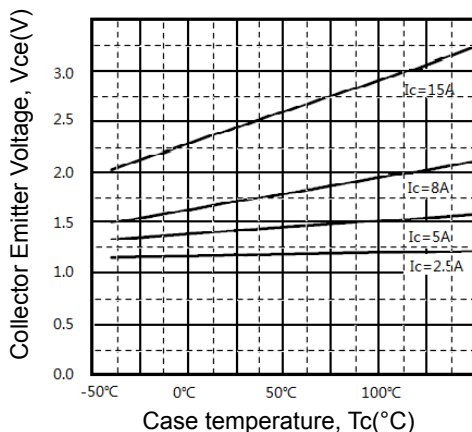


Figure 7. Capacitance Characteristics

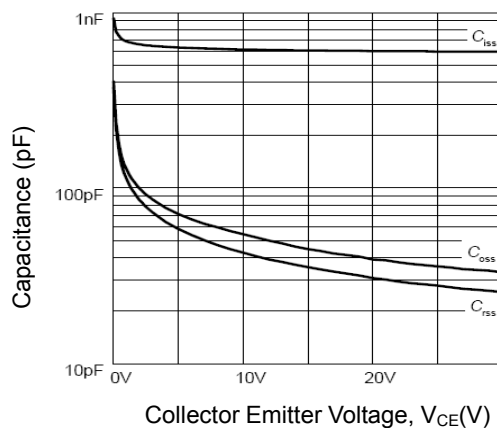


Figure 13. Switching Loss vs. Collector Current

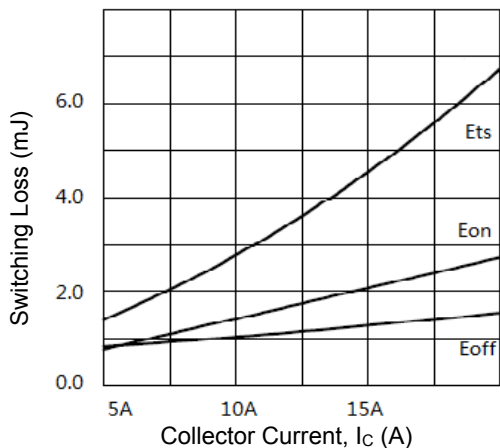
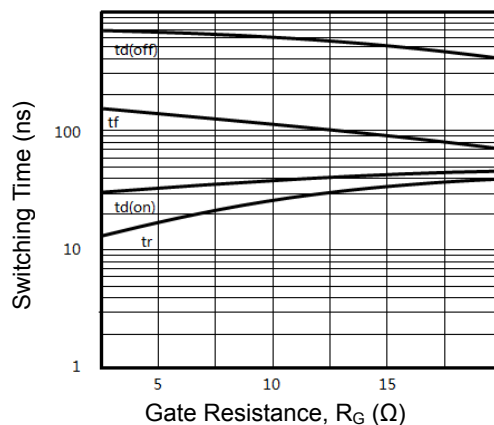


Figure 8. Switching Characteristics vs. Gate Resistance



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Typical Performance Characteristics (Continued)

Figure 9. Switching Characteristics vs. Gate Resistance

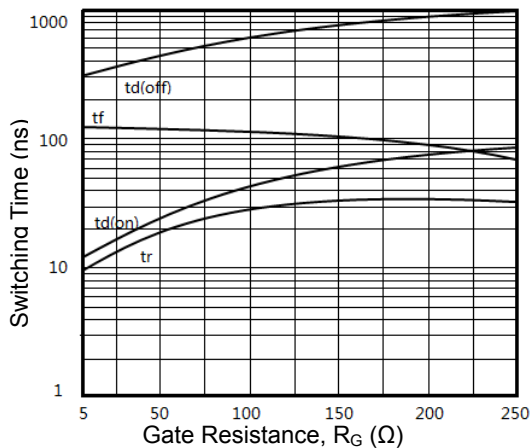


Figure 10. Switching Loss vs. Gate Resistance

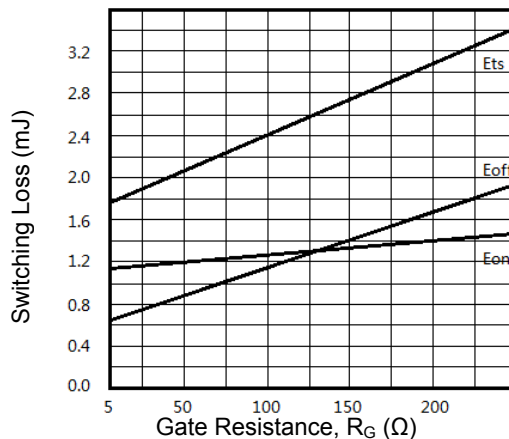


Figure 14. Gate Charge Characteristics

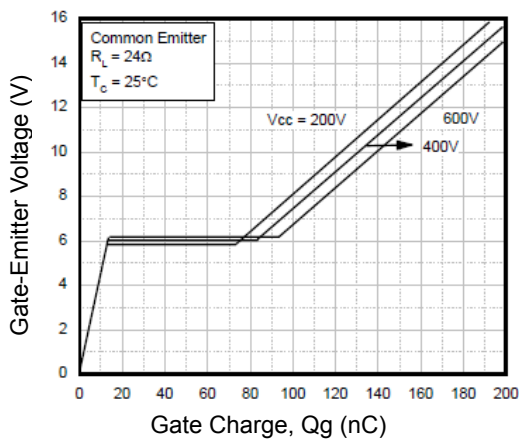


Figure 15. SOA Characteristics

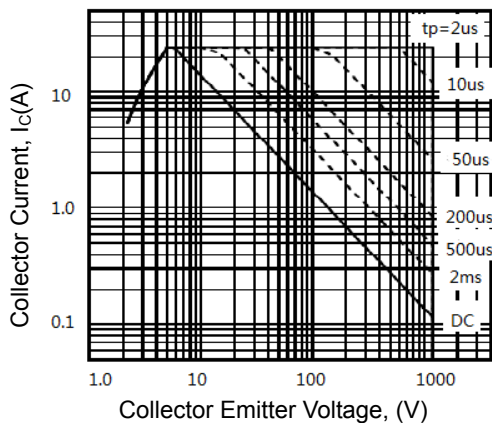
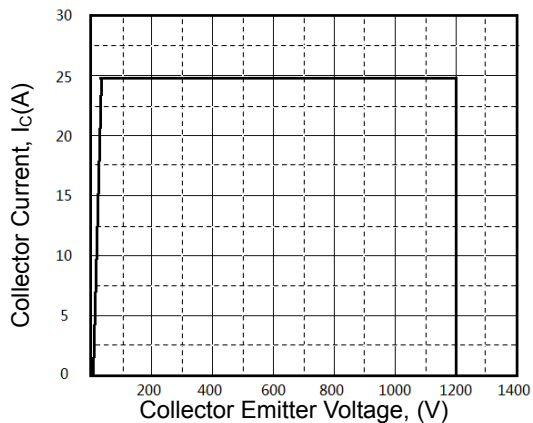
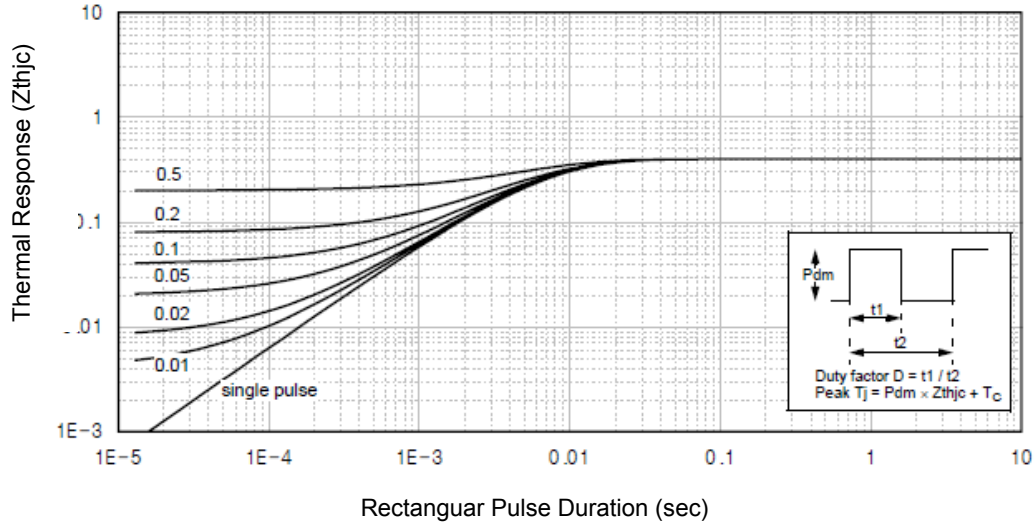


Figure 16. Turn-Off SOA



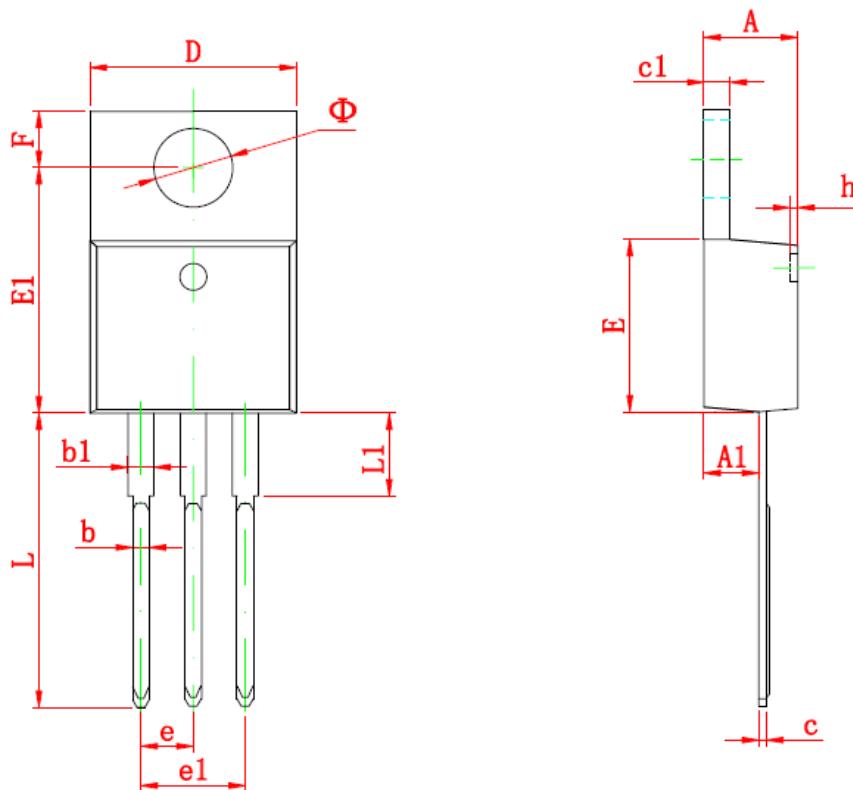
Typical Performance Characteristics (Continued)

Figure 17. Transient Thermal Impedance of IGBT



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Mechanical Dimensions (continued)



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 4.470 | 4.670 | 0.176 | 0.184 |
| A1 | 2.520 | 2.820 | 0.099 | 0.111 |
| b | 0.710 | 0.910 | 0.028 | 0.036 |
| b1 | 1.170 | 1.370 | 0.046 | 0.054 |
| c | 0.310 | 0.530 | 0.012 | 0.021 |
| c1 | 1.170 | 1.370 | 0.046 | 0.054 |
| D | 10.010 | 10.310 | 0.394 | 0.406 |
| E | 8.500 | 8.900 | 0.335 | 0.350 |
| E1 | 12.060 | 12.460 | 0.475 | 0.491 |
| e | 2.540 TYP | | 0.100 TYP | |
| e1 | 4.980 | 5.180 | 0.196 | 0.204 |
| F | 2.590 | 2.890 | 0.102 | 0.114 |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| L | 13.400 | 13.800 | 0.528 | 0.543 |
| L1 | 3.560 | 3.960 | 0.140 | 0.156 |
| ϕ | 3.735 | 3.935 | 0.147 | 0.155 |

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