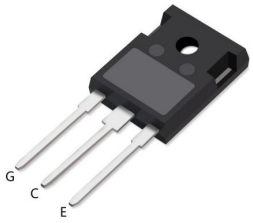
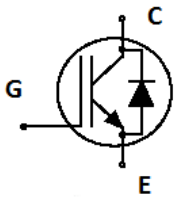
# THG45N120FBKH

## 1200V 45A Fieldstop Planar IGBT

Advanced field-stop planar technology for low conduction loss, fast switching performance and rugged operation in high-power conversion systems.




Package view and circuit symbol

### General Features

- 1200 V breakdown voltage
- VCE(sat), typ. = 2.5 V @ IC = 45 A
- Field-stop planar technology with positive temperature coefficient
- High-speed switching with low power loss
- 10 μs short-circuit withstand capability
- 175 °C maximum junction temperature

### Applications

- Solar Converters
- Welding Converters
- UPS

## Key Performance Parameters

| Parameter | Value | Unit |
|---|---|---|
| $V_{CES}$, min @ $T_{J = 25\,°C}$ | **1200** | V |
| $T_J$, maximum junction temperature | **175** | °C |
| $I_C$ @ $T_{C = 100\,°C}$ | **45** | A |
| $I_{C,pulse}$ @ $T_C$ = 25 °C, tp = 10 μs | **135** | A |
| $V_{CE(sat)}$, typ. @ $V_{GE = 15\,V}$ | **2.5** | V |
| $Q_g$, typ. | **128** | nC |

RoHS SGS

## Marking Information

| Product Name | Package | Marking |
|---|---|---|
| THG45N120FBKH | TO-247H | THG45N120FBKH |

# Table of contents

Key Performance Parameters ..... 1
Marking Information ..... 1
Maximum Ratings ..... 3
Diode Forward Current ..... 3
Electerical Characteristics ..... 4
Diode Characteristics ..... 5
Typical Performance Characteristics ..... 6
Package Information ..... 9
Notice ..... 10

## Maximum Ratings (TJ = 25℃ unless otherwise noted)

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Collector−to−Emitter Voltage | | $V_{CE}$ | 1200 | V |
| Gate−to−Emitter Voltage | | $V_{GE}$ | ±30 | V |
| Collector Current | $T_C$=25℃ | $I_C$ | 90 | A |
| | $T_C$=100℃ | | 45 | |
| Pulsed Collector Current | $T_C$=25℃ tp limited by Tvjmax | $I_{CM}$ | 135 | A |
| Diode Forward Current | $T_C$=25℃ | $I_F$ | 40 | |
| | $T_C$=100℃ | | 20 | |
| Pulsed Diode Forward Current | $T_C$=25℃ tp limited by Tvjmax | $I_{FM}$ | 60 | |
| Short Circuit Withstand Time $V_{GE}$ = 15 V, $V_{CC}$ = 800 V, $T_C$ = 25℃ | | $T_{SC}$ | 10 | μs |
| Power Dissipation | $T_C$=25℃ | $P_D$ | 625 | W |
| | $T_C$=100℃ | | 326 | |
| Operating Junction and Storage Temperature Range | | $T_J$,$T_{stg}$ | -55 To +175 | ℃ |
| Lead Temperature for Soldering Purposes | | $T_L$ | 270 | |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction−to−Case for IGBT | $R_{thJC}$ | 0.23 | ℃/W |
| Thermal Resistance, Junction−to−Case for FRD | $R_{thJC}$ | 1 | |
| Thermal Resistance, Junction−to−Ambient | $R_{thJA}$ | 62.5 | |

## Electerical Characteristics ($T_J$ = 25℃ unless otherwise specified)

| Parameter | Symbol | Test Condition | | Value | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | min. | typ. | max. | |
| Collector−to−Emitter Breakdown Voltage | $B_{VCES}$ | $V_{GE}$=0V,IC=250μA | | 1200 | - | - | V |
| Zero Gate Voltage Collector Current | $I_{CES}$ | $V_{GE}$=0V,$V_{CE}$=$V_{CES}$ | | - | - | 40 | μA |
| Gate−to−Emitter leakage Current | $I_{GES}$ | $V_{GE}$=±30V,VCE=0V | | - | - | ±300 | nA |
| Gate−to−Emitter Threshold Voltage | $V_{GE(th)}$ | $V_{GE}$=$V_{CE}$ , $I_C$=1mA | $T_J$=25℃ | 5.2 | - | 6.6 | V |
| | | | $T_J$=150℃ | - | 4.3 | - | |
| Collector−to−Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}$=15V, $I_C$=45A | $T_J$=25℃ | - | 2.5 | 3 | V |
| | | | $T_J$=150℃ | - | 2.8 | - | |
| Input Capacitance | $C_{IES}$ | $V_{CE}$ = 25 V, $V_{GE}$ = 0 V, f = 1 MHz | | - | 3000 | - | pF |
| Output Capacitance | $C_{OES}$ | | | - | 220 | - | |
| Reverse Transfer Capacitance | $C_{RES}$ | | | - | 73 | - | |
| Total Gate Charge | Qg | $V_{CE}$ = 600 V, $V_{GE}$ = 15 V, $I_C$ = 45 A | | - | 128 | - | nC |
| Gate-emitter charge | Qge | | | | 39 | | |
| Gate-collector charge | Qgc | | | | 68 | | |
| Turn−On Delay Time | td(on) | $V_{CE}$ = 600 V $V_{GE}$ = -5/15 V $I_C$ = 45 A $R_G$ = 27Ω TJ = 25℃ | | - | 81 | - | ns |
| Turn−Off Delay Time | td(off) | | | - | 380 | - | |
| Rise time | tr | | | - | 26 | - | |
| Fall time | tf | | | - | 180 | - | |
| Turn−On Switching Loss | Eon | | | - | 7.8 | - | mJ |
| Turn−Off Switching Loss | Eoff | | | - | 1.8 | - | |
| Turn−On Delay Time | td(on) | $V_{CE}$ = 600 V $V_{GE}$ = -5/15 V $I_C$ = 45 A $R_G$ = 27Ω TJ = 150℃ | | - | 94 | - | ns |
| Turn−Off Delay Time | td(off) | | | - | 220 | - | |
| Rise time | tr | | | - | 28 | - | |
| Fall time | tf | | | - | 213 | - | |
| Turn−On Switching Loss | Eon | | | - | 7.4 | - | mJ |
| Turn−Off Switching Loss | Eoff | | | - | 2.5 | - | |

## Diode Characteristics

| Parameter | Symbol | Test Condition | | Value | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | min. | typ. | max. | |
| Diode Forward Voltage | $V_F$ | $I_F$ = 22.5 A | $T_J$ = 25℃ | - | 3.2 | 4.6 | V |
| | | | $T_J$ = 150℃ | - | 2.4 | - | |
| Reverse Recovery Time | trr | $V_R$ = 600 V, $I_F$ = 45 A, $d_{IF}/dt$ = 800 A/μs $T_J$ = 25℃ | | - | 33 | - | ns |
| Reverse Recovery Charge | Qrr | | | - | 400 | - | nC |
| Reverse Recovery Energy | Erec | | | - | 0.03 | - | mJ |
| Peak Reverse Recovery Current | $I_{RRM}$ | | | - | 18 | - | A |
| Reverse Recovery Time | trr | $V_R$ = 600 V, $I_F$ = 45 A, $d_{IF}/dt$ = 800 A/μs $T_J$ = 150℃ | | | 53 | | ns |
| Reverse Recovery Charge | Qrr | | | | 1000 | | nC |
| Reverse Recovery Energy | Erec | | | | 0.08 | | mJ |
| Peak Reverse Recovery Current | $I_{RRM}$ | | | | 25 | | A |

## Typical Performance Characteristics

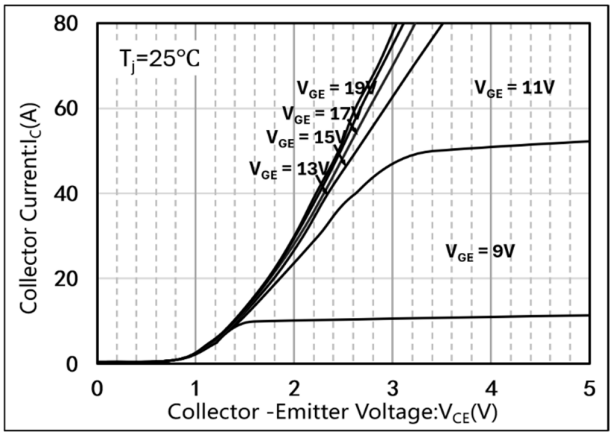



Fig 1. Typical output characteristic

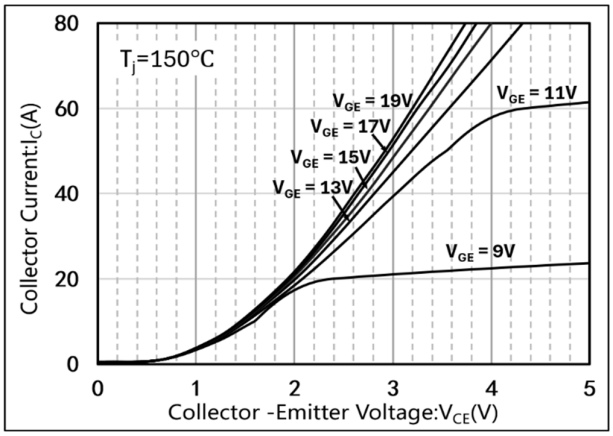



Fig 2. Typical output characteristic

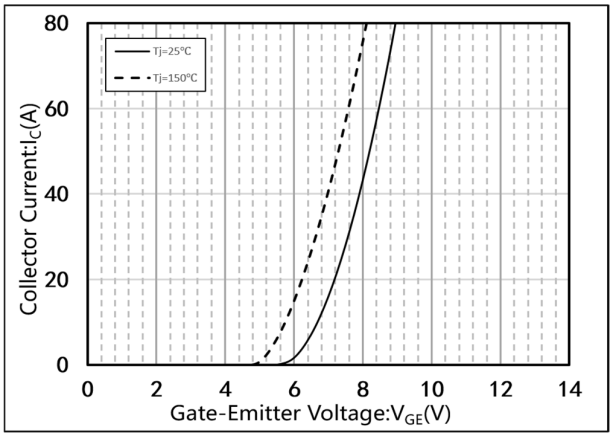



Fig 3. Typical transfer characteristic

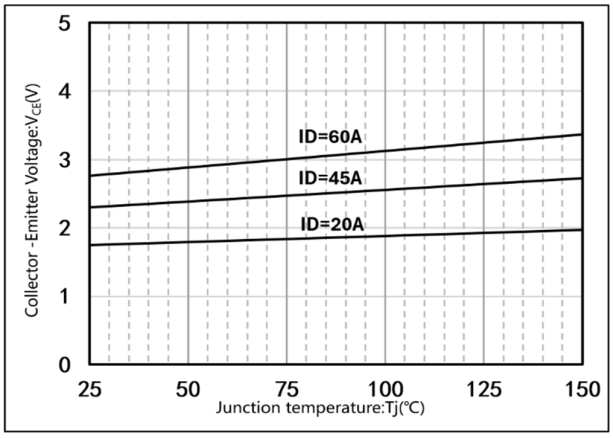



Fig 4. Typical collector-emitter saturation voltage as a function of junction temperature

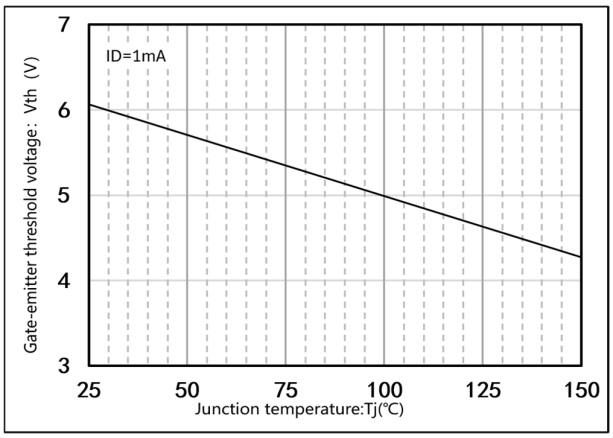



Fig 5. Gate-emitter threshold voltage as a function of junction temperature

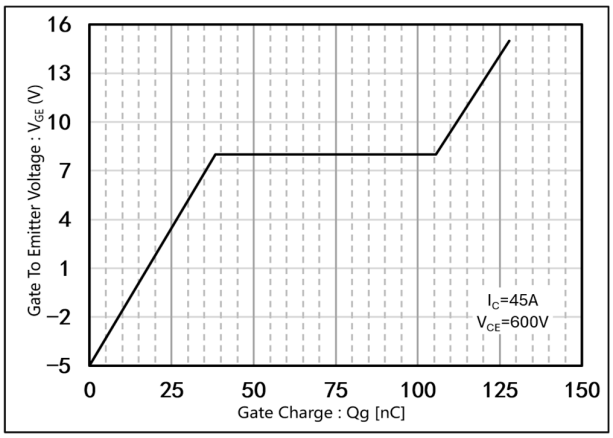



Fig 6. Typical gate charge

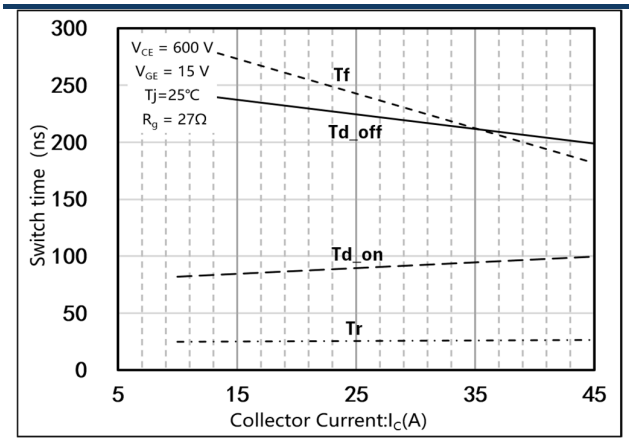



Fig 7. Typical switching times as a function of collector current

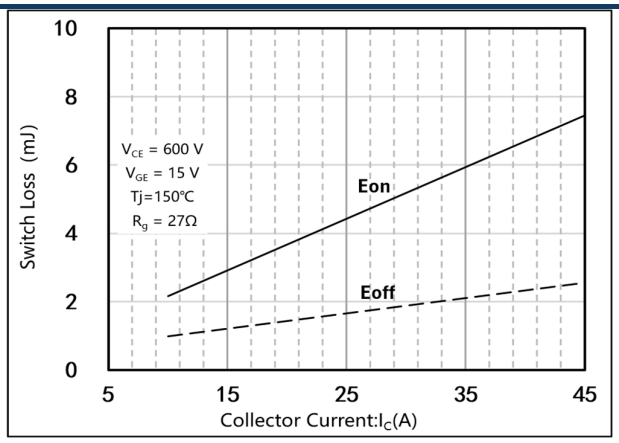



Fig 8. Typical switching energy losses as a function of collector current

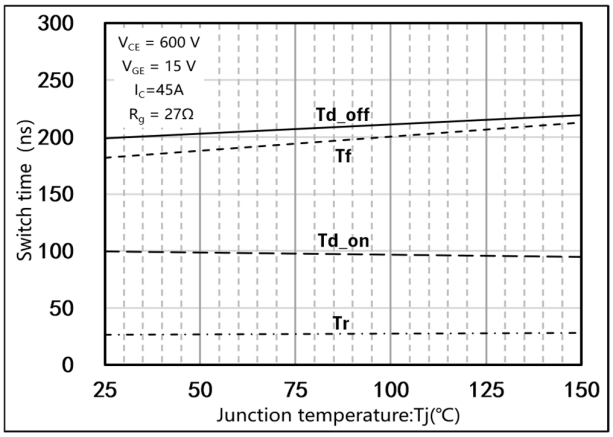



Fig 9. Typical switching times as a function of junction temperature

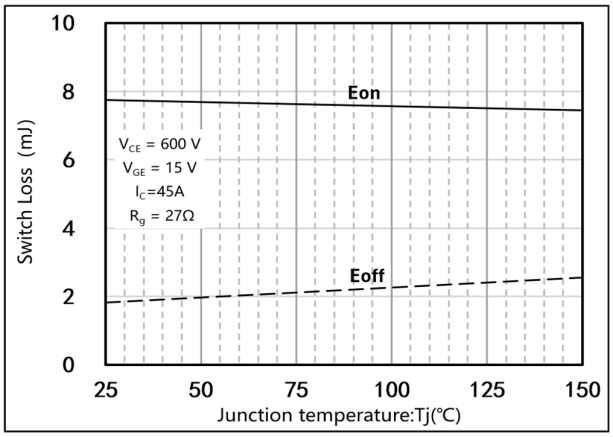



Fig 10. Typical switching energy losses as a function of junction temperature

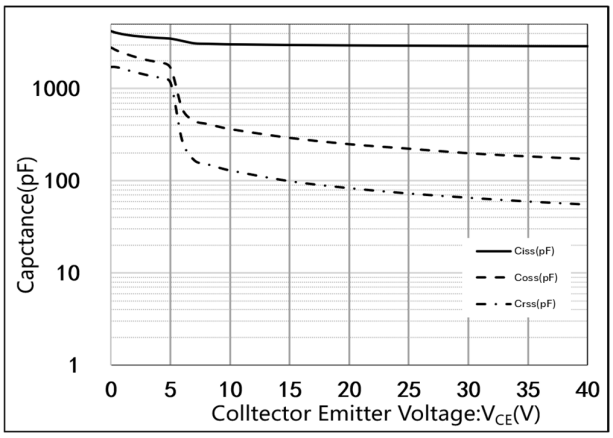



Fig 11. Typical capacitance as a function of collector-emitter voltage

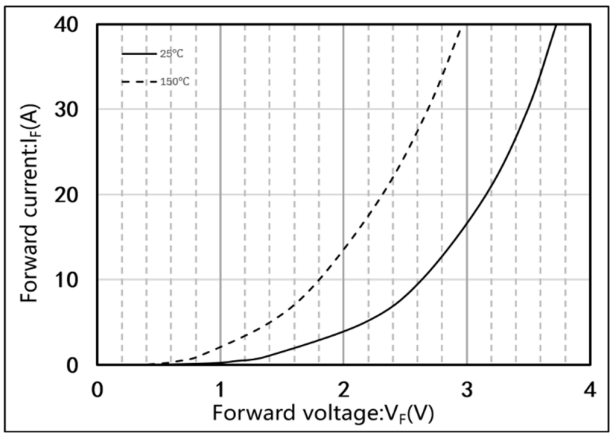



Fig 12. Typical diode forward current as a function of forward voltage

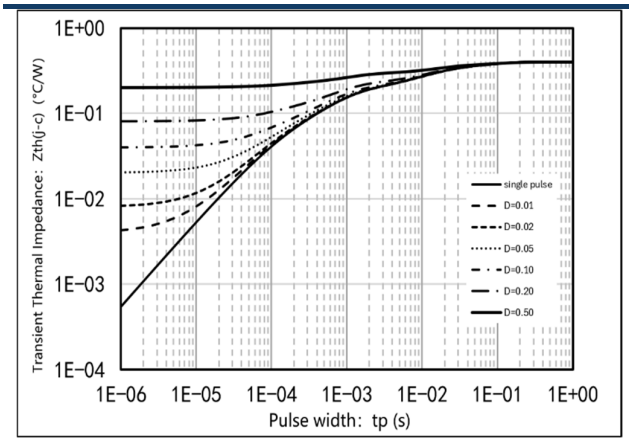



Fig 13. IGBT transient thermal impedance

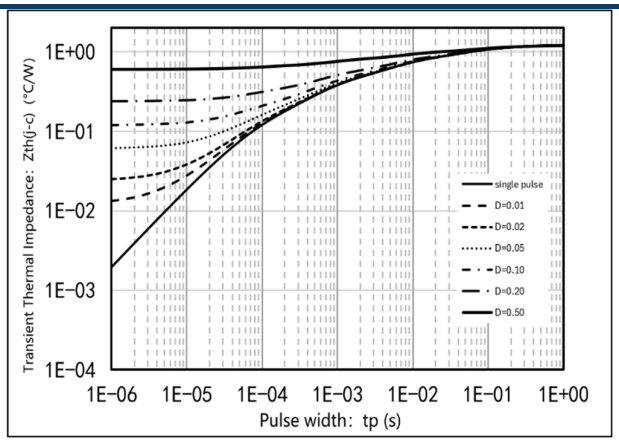
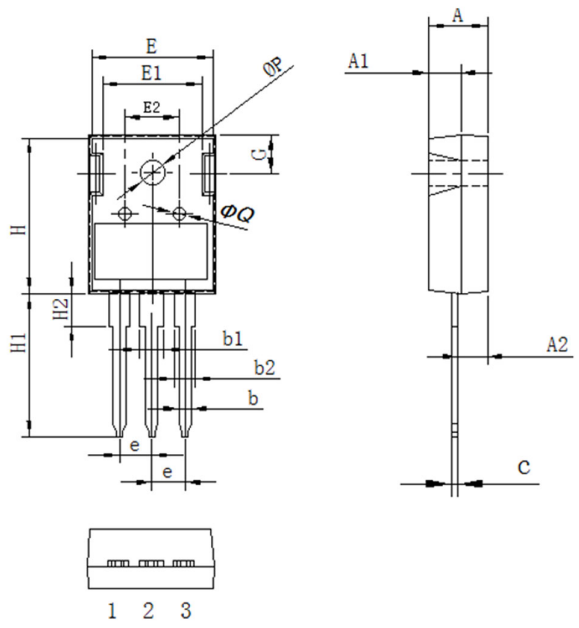



Fig 14. Diode transient thermal impedance

## Package Information




基本尺寸

| Symbol | 单位 mm | | |
|---|---|---|---|
| | Min | Nom | Max |
| A | 4.80 | 5.00 | 5.20 |
| A1 | 2.80 | 3.00 | 3.20 |
| A2 | 2.20 | 2.40 | 2.60 |
| b | 1.05 | 1.20 | 1.35 |
| b1 | 2.80 | 3.00 | 3.20 |
| b2 | 1.80 | 2.00 | 2.20 |
| c | 0.50 | 0.60 | 0.70 |
| e | 5.35 | 5.45 | 5.75 |
| E | 15.6 | 15.80 | 16.0 |
| E1 | 12.3 | 12.50 | 12.7 |
| E2 | 6.00 | 6.20 | 6.40 |
| H | 20.5 | 21.0 | 21.5 |
| H1 | 19.0 | 20.0 | 21.0 |
| H2 | 3.00 | 4.00 | 5.00 |
| G | 5.70 | 5.90 | 6.10 |
| ΦP | 3.30 | 3.50 | 3.50 |
| ΦQ | 2.30 | 2.50 | 2.70 |

## Notice

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