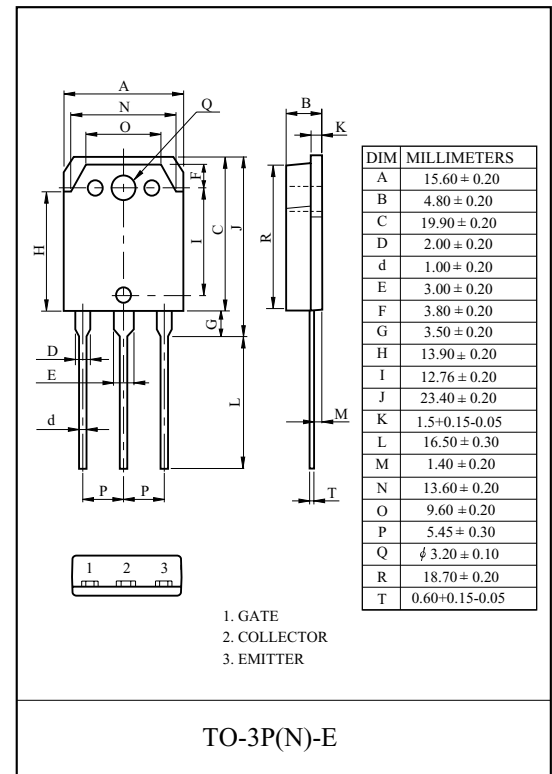


## General Description

KEC NPT IGBTs offer lowest losses and highest energy efficiency for application such as IH (induction heating), UPS, General inverter and other soft switching applications.

## FEATURES

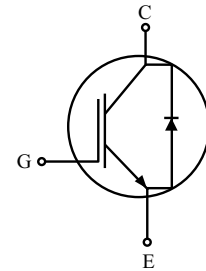
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA using NPT technology



## MAXIMUM RATING (Ta=25 °C)

| CHARACTERISTIC                   |                         | SYMBOL     | RATING      | UNIT |
|----------------------------------|-------------------------|------------|-------------|------|
| Collector-Emitter Voltage        |                         | $V_{CES}$  | 1200        | V    |
| Gate-Emitter Voltage             |                         | $V_{GES}$  | ±20         | V    |
| Collector Current                | @T <sub>C</sub> =25 °C  | $I_C$      | 40          | A    |
|                                  | @T <sub>C</sub> =100 °C |            | 25          | A    |
| Pulsed Collector Current         |                         | $I_{CM}^*$ | 75          | A    |
| Diode Continuous Forward Current | @T <sub>C</sub> =100 °C | $I_F$      | 25          | A    |
| Diode Maximum Forward Current    |                         | $I_{FM}$   | 110         | A    |
| Maximum Power Dissipation        | @T <sub>C</sub> =25 °C  | $P_D$      | 300         | W    |
|                                  | @T <sub>C</sub> =100 °C |            | 120         | W    |
| Maximum Junction Temperature     |                         | $T_j$      | 150         | °C   |
| Storage Temperature Range        |                         | $T_{stg}$  | -55 to +150 | °C   |

\*Repetitive rating : Pulse width limited by max. junction temperature



## THERMAL CHARACTERISTIC

| CHARACTERISTIC                               | SYMBOL          | MAX. | UNIT |
|--|-----------------|------|------|
| Thermal Resistance, Junction to Case (IGBT)  | $R_{\theta JC}$ | 0.4  | °C/W |
| Thermal Resistance, Junction to Case (DIODE) | $R_{\theta JC}$ | 1.2  | °C/W |

# KGH25N120NDA

## ELECTRICAL CHARACTERISTICS (Ta=25 °C)

| CHARACTERISTIC                       | SYMBOL        | TEST CONDITION   | MIN.  | TYP. | MAX.      | UNIT    |    |
|--------------------------------------|---------------|--|---|------|-----------|---------|----|
| <b>Static</b>                        |               |  |   |      |           |         |    |
| Collector-Emitter Breakdown Voltage  | $BV_{CES}$    | $V_{GE}=0V, I_C=500\mu A$  | 1200  | -    | -         | V       |    |
| Collector Cut-off Current            | $I_{CES}$     | $V_{GE}=0V, V_{CE}=1200V$  | -   | -    | 250       | $\mu A$ |    |
| Gate Leakage Current                 | $I_{GES}$     | $V_{CE}=0V, V_{GE}=\pm 20V$  | -   | -    | $\pm 100$ | nA      |    |
| Gate Threshold Voltage               | $V_{GE(th)}$  | $V_{GE}=V_{CE}, I_C=25mA$  | 5.0   | 6.0  | 7.0       | V       |    |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}=15V, I_C=25A$  | -   | 2.5  | 3.0       | V       |    |
| <b>Dynamic</b>                       |               |  |   |      |           |         |    |
| Total Gate Charge                    | $Q_g$         | $V_{CC}=600V, V_{GE}=15V, I_C=25A$   | -   | 200  | -         | nC      |    |
| Gate-Emitter Charge                  | $Q_{ge}$      |  | -   | 20   | -         | nC      |    |
| Gate-Collector Charge                | $Q_{gc}$      |  | -   | 100  | -         | nC      |    |
| Turn-On Deley Time                   | $t_{d(on)}$   | $V_{CC}=600V, I_C=25A, V_{GE}=15V, R_G=10\ \Omega$<br>Inductive Load, $T_C=25\ ^\circ C$ | -   | 60   | -         | ns      |    |
| Rise Time                            | $t_r$         |  | -   | 60   | -         | ns      |    |
| Turn-Off Deley Time                  | $t_{d(off)}$  |  | -   | 200  | -         | ns      |    |
| Fall Time                            | $t_f$         |  | -   | 50   | -         | ns      |    |
| Turn-On Switching Loss               | $E_{on}$      |  | -   | 2.0  | -         | mJ      |    |
| Turn-Off Switching Loss              | $E_{off}$     |  | -   | 1.0  | -         | mJ      |    |
| Total Switching Loss                 | $E_{is}$      |  | -   | 3.0  | -         | mJ      |    |
| Turn-On Deley Time                   | $t_{d(on)}$   |  | $V_{CC}=600V, I_C=25A, V_{GE}=15V, R_G=10\ \Omega$<br>Inductive Load, $T_C=125\ ^\circ C$ | -    | 60        | -       | ns |
| Rise Time                            | $t_r$         |  |   | -    | 60        | -       | ns |
| Turn-Off Deley Time                  | $t_{d(off)}$  | -  |   | 200  | -         | ns      |    |
| Fall Time                            | $t_f$         | -  |   | 70   | -         | ns      |    |
| Turn-On Switching Loss               | $E_{on}$      | -  |   | 3.0  | -         | mJ      |    |
| Turn-Off Switching Loss              | $E_{off}$     | -  |   | 1.5  | -         | mJ      |    |
| Total Gate Charge                    | $E_{is}$      | -  |   | 4.5  | -         | mJ      |    |
| Input Capacitance                    | $C_{ies}$     | $V_{CE}=30V, V_{GE}=0V, f=1MHz$  |   | -    | 2200      | -       | pF |
| Ouput Capacitance                    | $C_{oes}$     |  |   | -    | 200       | -       | pF |
| Reverse Transfer Capacitance         | $C_{res}$     |  | -   | 100  | -         | pF      |    |

## ELECTRICAL CHARACTERISTIC OF DIODE

| CHARACTERISTIC                      | SYMBOL   | TEST CONDITION     | MIN.                | TYP. | MAX. | UNIT |    |
|-------------------------------------|----------|--------------------|---------------------|------|------|------|----|
| Diode Forward Voltage               | $V_F$    | $I_F=10A$          | $T_C=25\ ^\circ C$  | -    | 1.8  | 2.5  | V  |
|                                     |          |                    | $T_C=125\ ^\circ C$ | -    | 1.7  | -    |    |
| Diode Reverse Recovery Time         | $t_{rr}$ | $I_F=10A$          | $T_C=25\ ^\circ C$  | -    | 250  | 350  | ns |
|                                     |          |                    | $T_C=125\ ^\circ C$ | -    | 300  | -    |    |
| Diode Peak Reverse Recovery Current | $I_{rr}$ | $di/dt=200A/\mu s$ | $T_C=25\ ^\circ C$  | -    | 5    | 10   | A  |
|                                     |          |                    | $T_C=125\ ^\circ C$ | -    | 10   | -    |    |

# KGH25N120NDA

Fig 1. Typical Output Characteristics

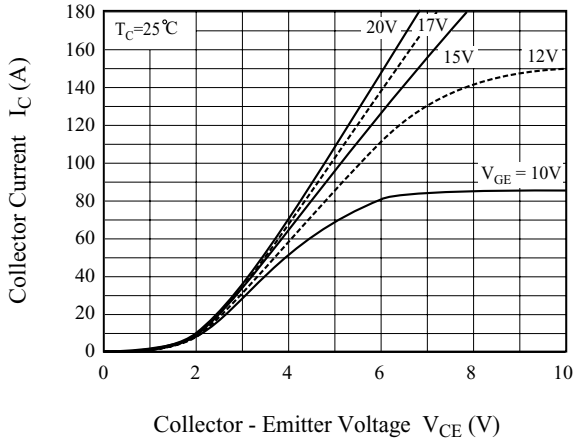


Fig 2. Typical Saturation Voltage Characteristics

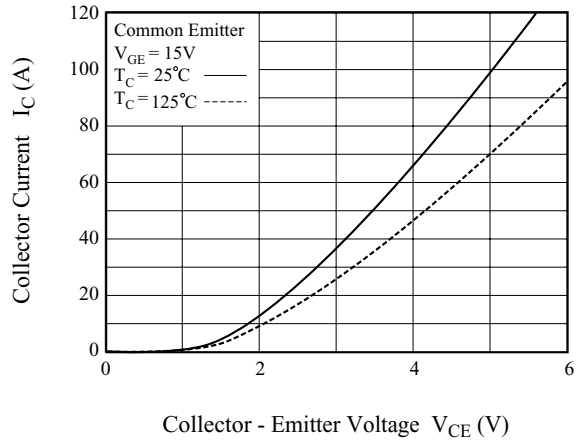


Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level

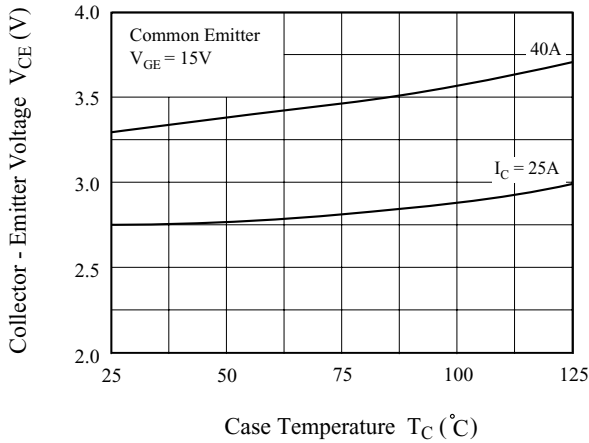


Fig 4. Saturation Voltage vs. V\_GE

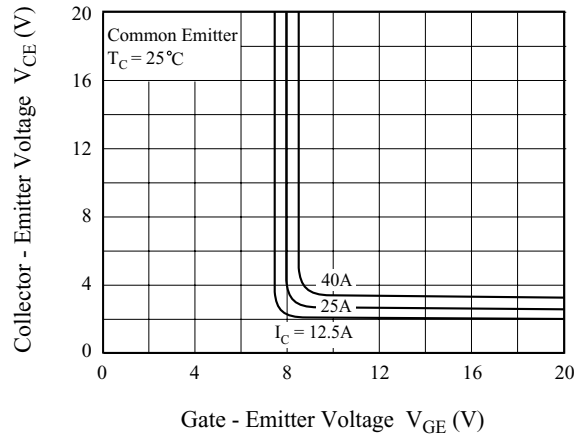


Fig 5. Saturation Voltage vs. V\_GE

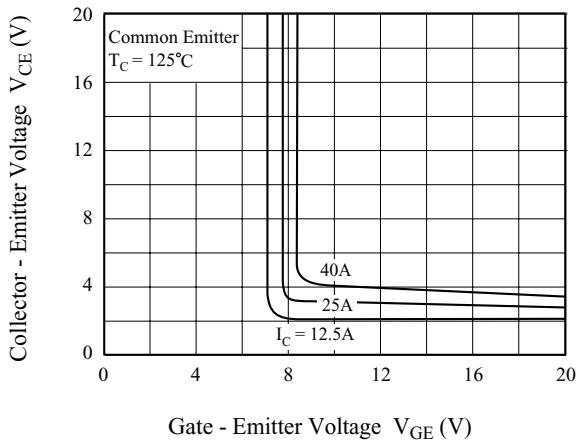
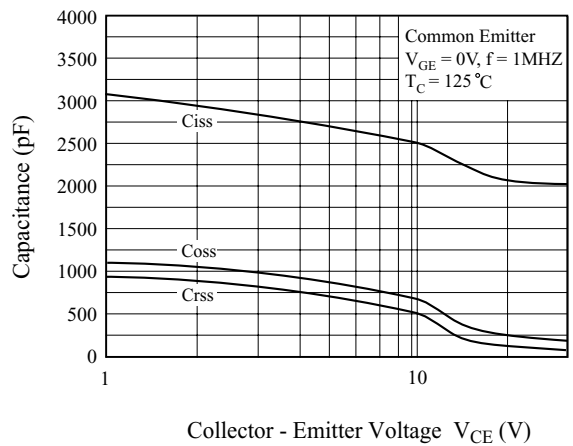


Fig 6. Capacitance Characteristics



# KGH25N120NDA

Fig 7. Turn-On Characteristics vs. Gate Resistance

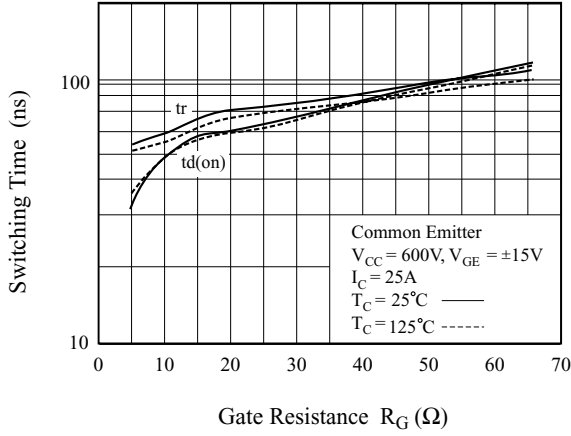


Fig 8. Turn-On Characteristics vs. Gate Resistance

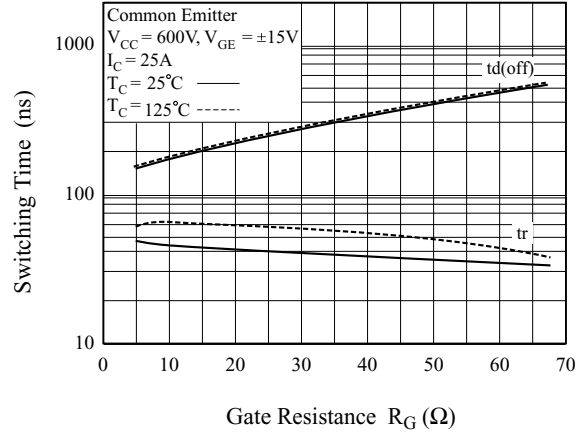


Fig 9. Switching Loss vs. Gate Resistance

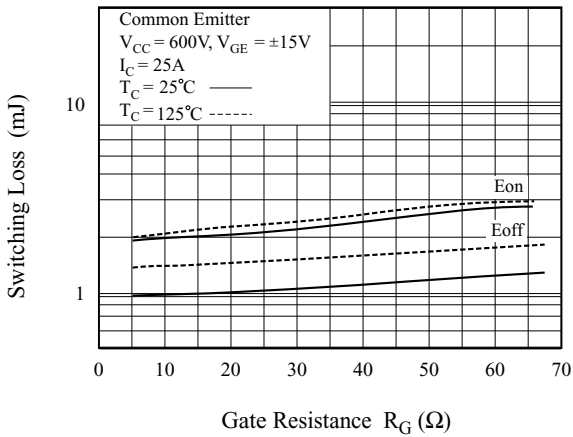


Fig 10. Turn-On Characteristics vs. Collector Current

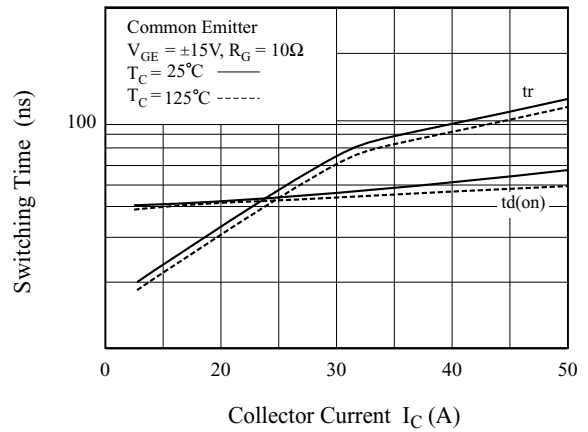


Fig 11. Turn-Off Characteristics vs. Collector Current

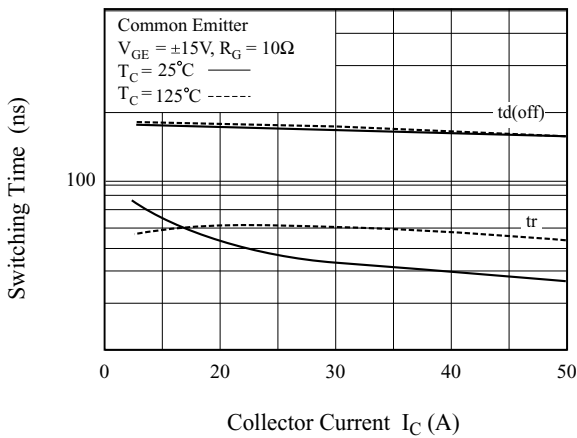
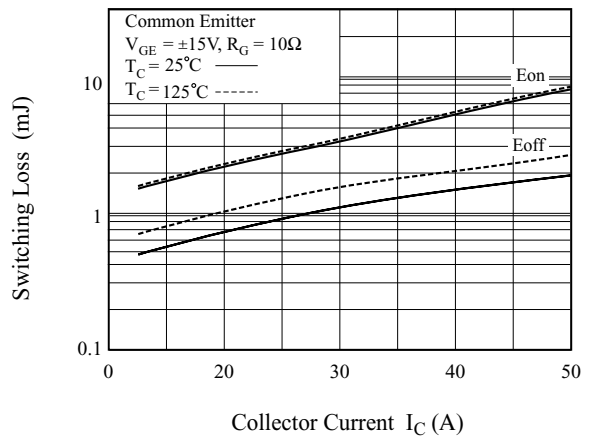


Fig 12. Switching Loss vs. Collector Current



# KGH25N120NDA

Fig 13. Gate Charge Characteristics

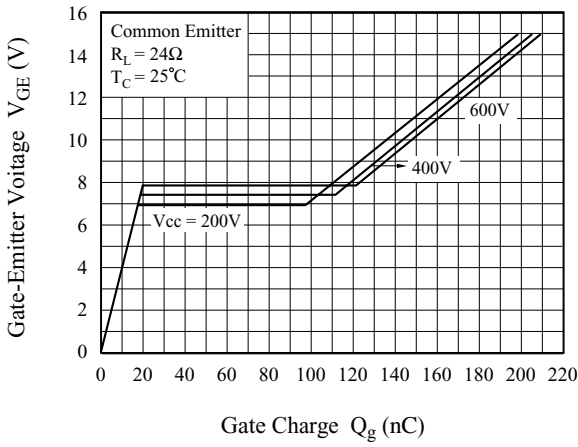


Fig 14. SOA Characteristics

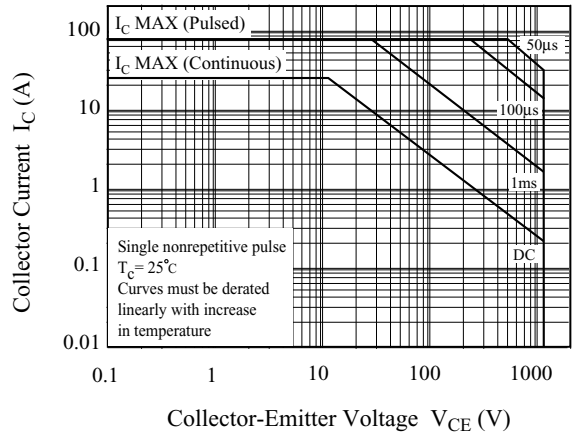


Fig 15. Turn-Off SOA

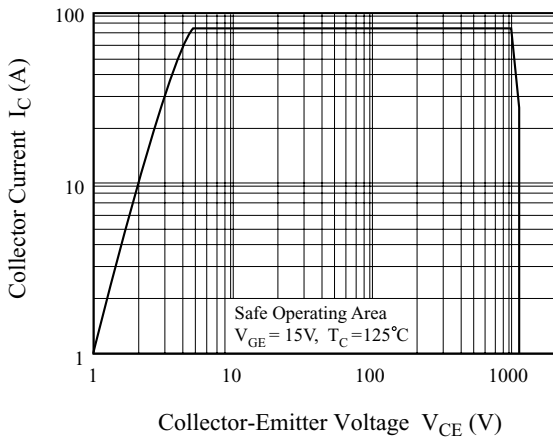
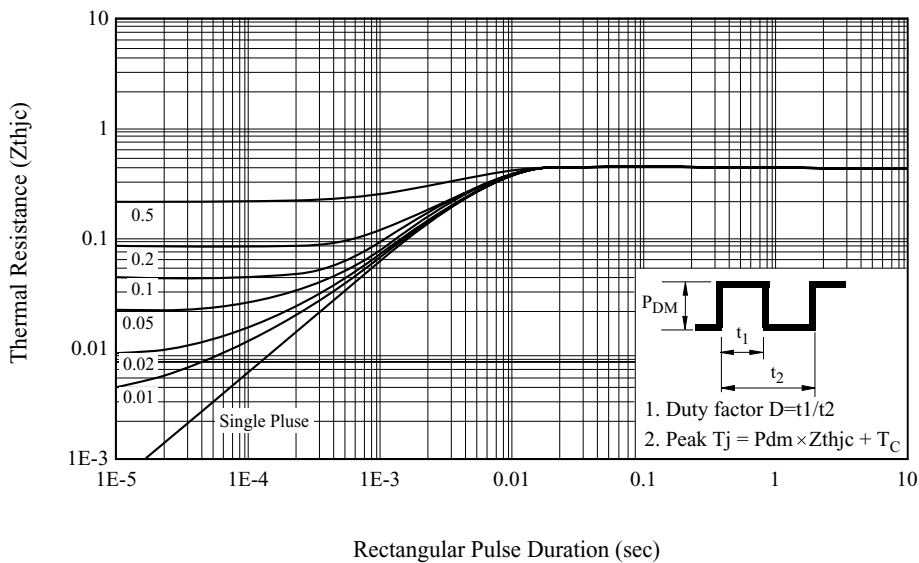


Fig 16. Transient Thermal Impedance of IGBT



# KGH25N120NDA

Fig 17. Forward Characteristics

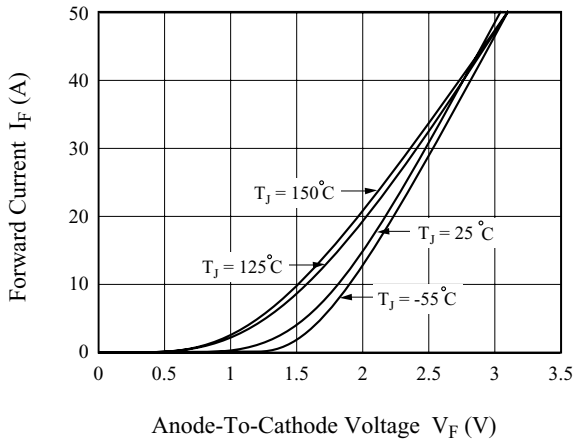


Fig 18. Reverse Recovery Current

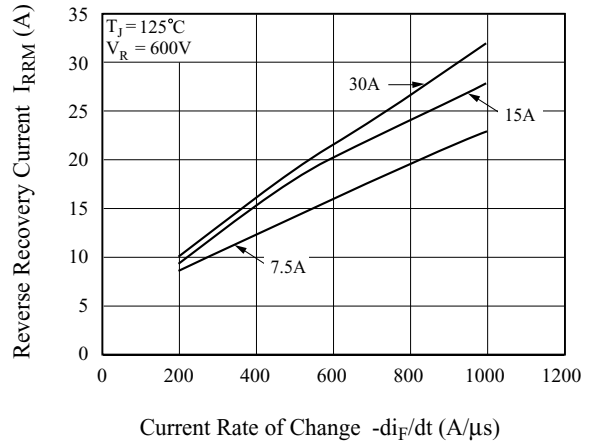


Fig 19. Maximum Average Forward Current vs. Case Temperature

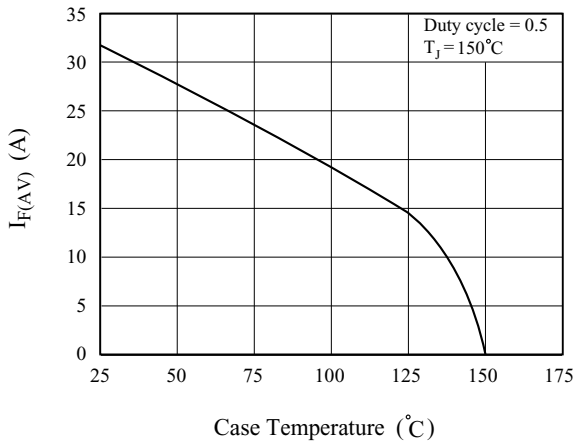


Fig 20. Reverse Recovery Time

