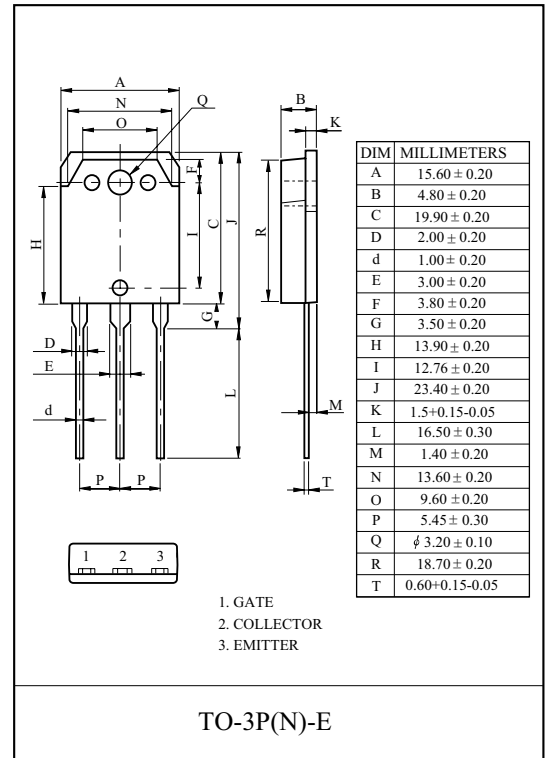


General Description

KEC NPT IGBTs offer low switching losses, high energy efficiency and high avalanche ruggedness for soft switching application such as IH(induction heating), microwave oven, etc.

FEATURES

- High speed switching
- High system efficiency
- Soft current turn-off waveforms
- Extremely enhanced avalanche capability



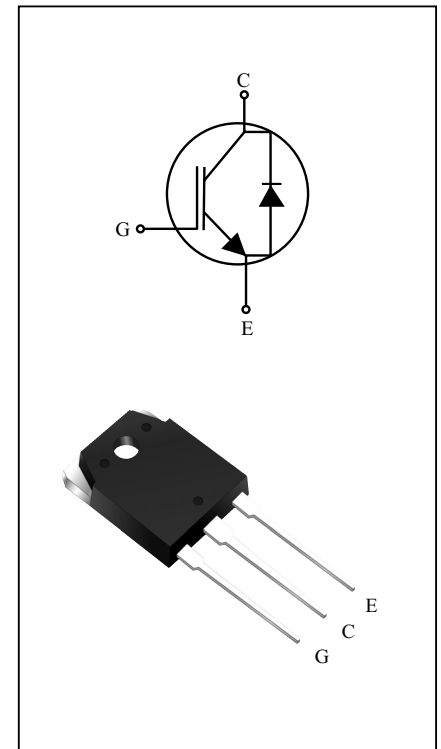
MAXIMUM RATING (Ta=25 °C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|----------------------------------|-------------------|----------------|------|
| Collector-Emitter Voltage | V _{CES} | 1200 | V |
| Gate-Emitter Voltage | V _{GES} | ± 20 | V |
| Collector Current | I _C | @Tc=25 | 50 |
| | | @Tc=100 | 30 |
| Pulsed Collector Current | I _{CM} * | 90 | A |
| Diode Continuous Forward Current | @Tc=100 | I _F | 30 |
| Diode Maximum Forward Current | I _{FM} | 150 | A |
| Maximum Power Dissipation | P _D | @Tc=25 | 310 |
| | | @Tc=100 | 125 |
| Maximum Junction Temperature | T _j | 150 | |
| Storage Temperature Range | T _{stg} | -55 to + 150 | |

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

THERMAL CHARACTERISTIC

| CHARACTERISTIC | SYMBOL | MAX. | UNIT |
|--|-------------------|------|------|
| Thermal Resistance, Junction to Case (IGBT) | R _{thJC} | 0.4 | /W |
| Thermal Resistance, Junction to Case (DIODE) | R _{thJC} | 2.8 | /W |
| Thermal Resistance, Junction to Ambient | R _{thJA} | 40 | /W |



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ELECTRICAL CHARACTERISTICS (Ta=25)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT | |
|--------------------------------------|---------------|--|---|------|-----------|------|----|
| Static | | | | | | | |
| Collector-Emitter Breakdown Voltage | BV_{CES} | $V_{GE}=0V, I_C=1mA$ | 1200 | - | - | V | |
| Collector Cut-off Current | I_{CES} | $V_{GE}=0V, V_{CE}=1200V$ | - | - | 1.0 | mA | |
| Gate Leakage Current | I_{GES} | $V_{CE}=0V, V_{GE}=\pm 20V$ | - | - | ± 100 | nA | |
| Gate Threshold Voltage | $V_{GE(th)}$ | $V_{GE}=V_{CE}, I_C=25mA$ | 4.0 | 5.5 | 7.0 | V | |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}=15V, I_C=30A$ | - | 1.95 | 2.30 | V | |
| | | $V_{GE}=15V, I_C=30A, T_C = 125$ | - | 2.25 | - | V | |
| | | $V_{GE}=15V, I_C=60A$ | - | 2.50 | - | V | |
| Dynamic | | | | | | | |
| Total Gate Charge | Q_g | $V_{CC}=600V, V_{GE}=15V, I_C=30A$ | - | 200 | 300 | nC | |
| Gate-Emitter Charge | Q_{ge} | | - | 20 | - | nC | |
| Gate-Collector Charge | Q_{gc} | | - | 80 | - | nC | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{CC}=600V, I_C=30A, V_{GE}=15V, R_G=10$ Inductive Load, $T_C = 25$ | - | 75 | - | ns | |
| Rise Time | t_r | | - | 45 | - | ns | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 320 | - | ns | |
| Fall Time | t_f | | - | 95 | - | ns | |
| Turn-On Switching Loss | E_{on} | | - | 4.7 | 6.5 | mJ | |
| Turn-Off Switching Loss | E_{off} | | - | 1.15 | 1.5 | mJ | |
| Total Switching Loss | E_{ts} | | - | 5.85 | 8.0 | mJ | |
| Turn-On Delay Time | $t_{d(on)}$ | | $V_{CC}=600V, I_C=30A, V_{GE}=15V, R_G=10$ Inductive Load, $T_C = 125$ | - | 70 | - | ns |
| Rise Time | t_r | | | - | 45 | - | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | | - | 340 | - | ns |
| Fall Time | t_f | - | | 140 | - | ns | |
| Turn-On Switching Loss | E_{on} | - | | 5.2 | 6.5 | mJ | |
| Turn-Off Switching Loss | E_{off} | - | | 1.8 | 2.3 | mJ | |
| Total Switching Loss | E_{ts} | - | | 7.0 | 8.8 | mJ | |
| Input Capacitance | C_{ies} | $V_{CE}=30V, V_{GE}=0V, f=1MHz$ | - | 3100 | - | pF | |
| Output Capacitance | C_{oes} | | - | 100 | - | pF | |
| Reverse Transfer Capacitance | C_{res} | | - | 80 | - | pF | |

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ELECTRICAL CHARACTERISTIC OF DIODE

| CHARACTERISTIC | SYMBOL | TEST CONDITION | | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------|----------|-------------------------------------|-------------|------|------|------|------|
| Diode Forward Voltage | V_F | $I_F = 30A$ | $T_C = 25$ | - | 1.9 | 2.5 | V |
| | | | $T_C = 125$ | - | 2.05 | - | |
| Diode Reverse Recovery Time | t_{rr} | $I_F = 30A$ | $T_C = 25$ | - | 250 | 330 | ns |
| | | | $T_C = 125$ | - | 320 | - | |
| Diode Peak Reverse Recovery Current | I_{rr} | $I_F = 30A$ $di/dt = 200A/\mu s$ | $T_C = 25$ | - | 29 | 35 | A |
| | | | $T_C = 125$ | - | 33 | - | |
| Diode Reverse Recovery Charge | Q_{rr} | $I_F = 30A$ $di/dt = 200A/\mu s$ | $T_C = 25$ | - | 3200 | 4700 | nC |
| | | | $T_C = 125$ | - | 4750 | - | |

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Typical Performance Characteristics

Fig 1. Saturation Voltage Characteristics

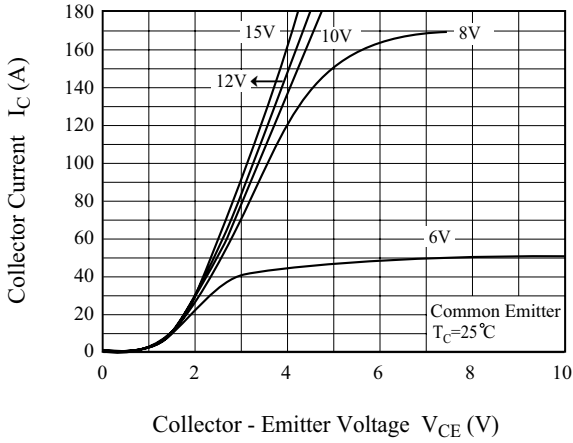


Fig 2. Saturation Voltage Characteristics

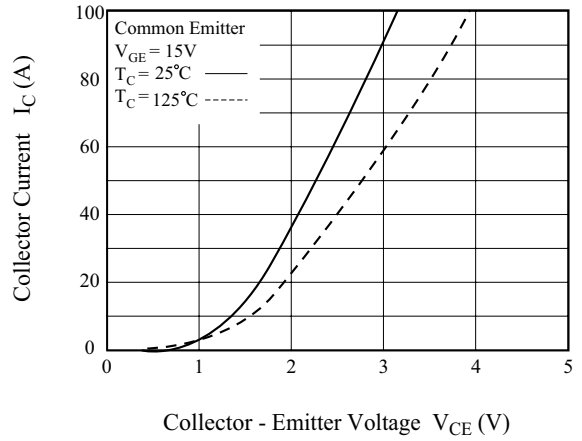


Fig 3. Saturation Voltage vs. Case Temperature

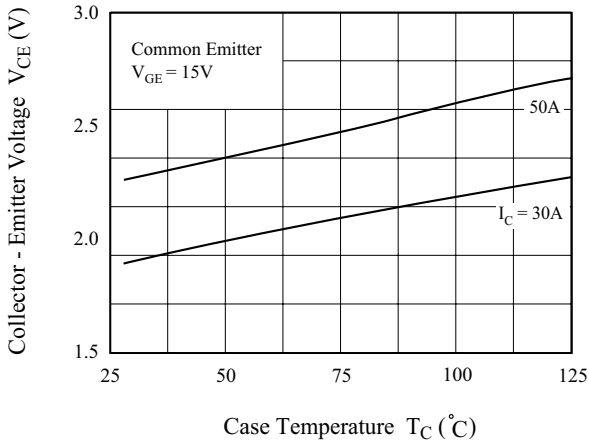


Fig 4. Saturation Voltage vs. V_{GE}

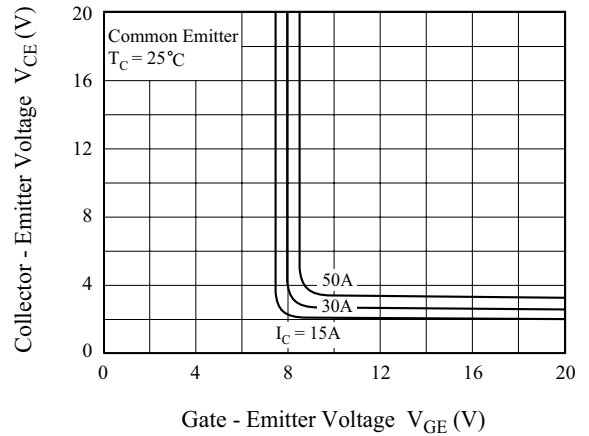


Fig 5. Saturation Voltage vs. V_{GE}

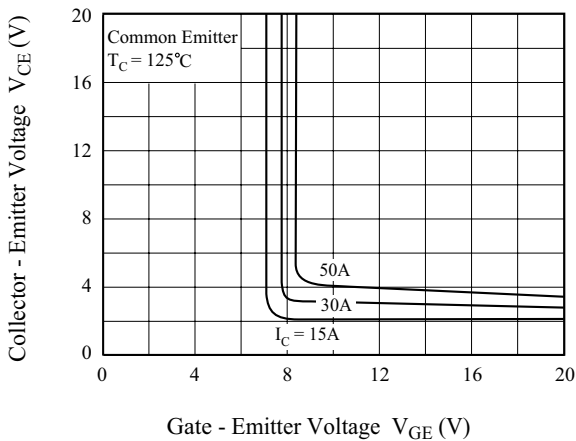
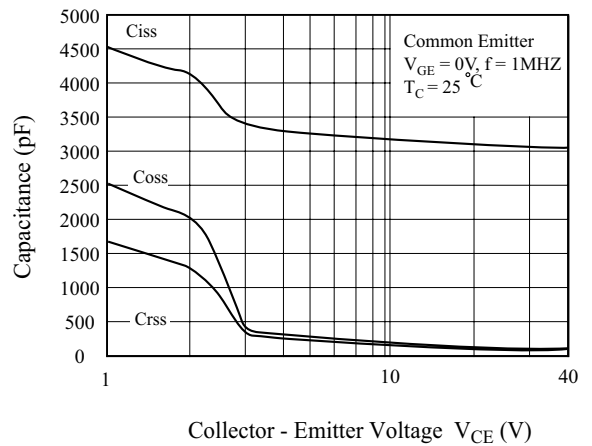


Fig 6. Capacitance Characteristics



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Typical Performance Characteristics (Continued)

Fig 7. Turn-On Characteristics vs. Gate Resistance

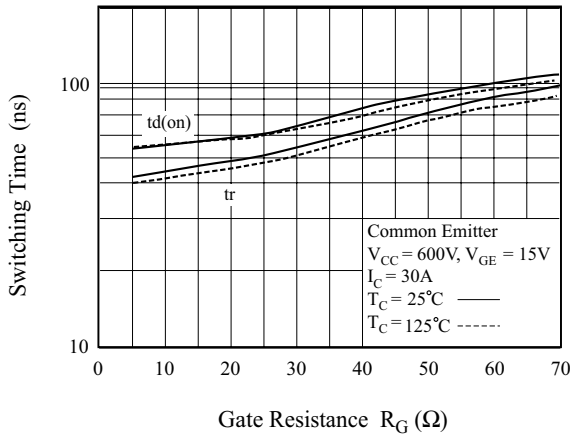


Fig 8. Turn-Off Characteristics vs. Gate Resistance

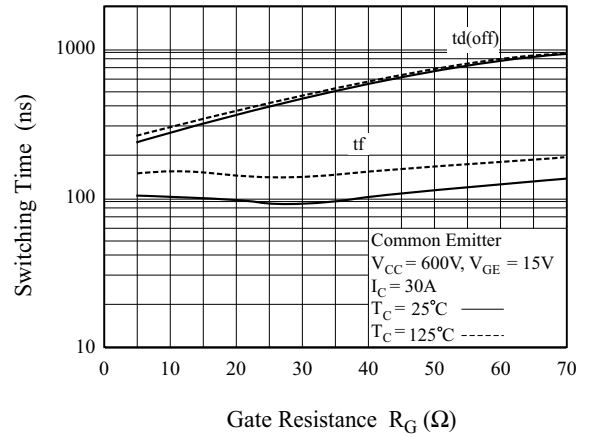


Fig 9. Switching Loss vs. Gate Resistance

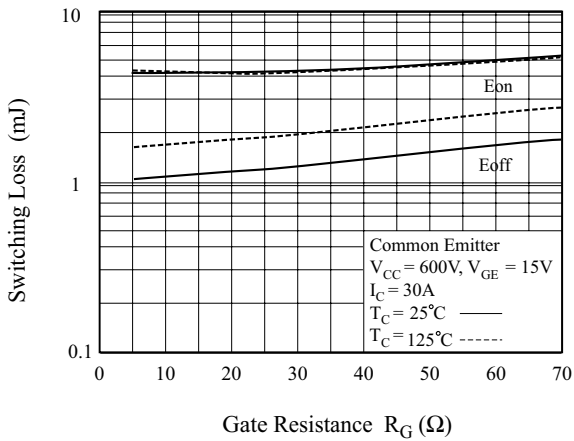


Fig 10. Turn-On Characteristics vs. Collector Current

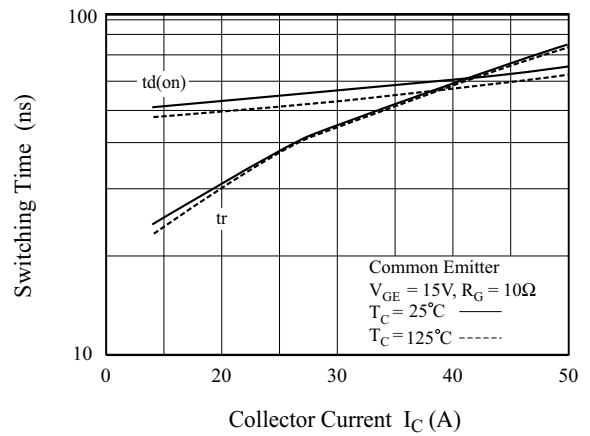


Fig 11. Turn-Off Characteristics vs. Collector Current

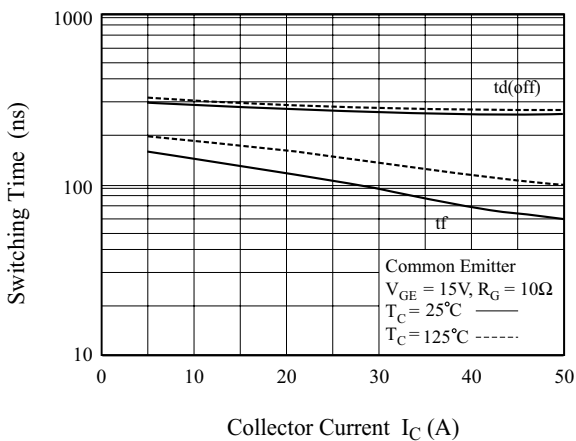
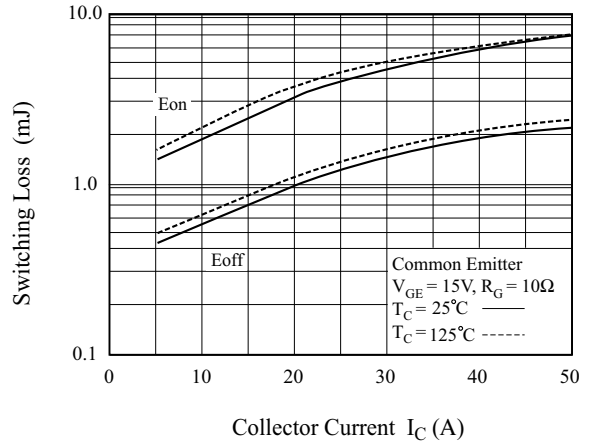


Fig 12. Switching Loss vs. Collector Current



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Typical Performance Characteristics (Continued)

Fig 13. Gate Charge Characteristics

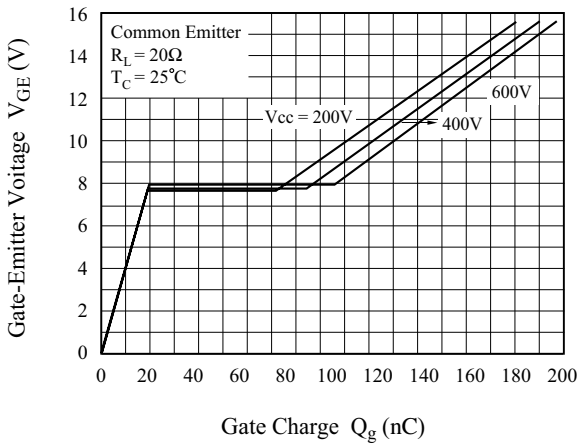


Fig 14. SOA Characteristics

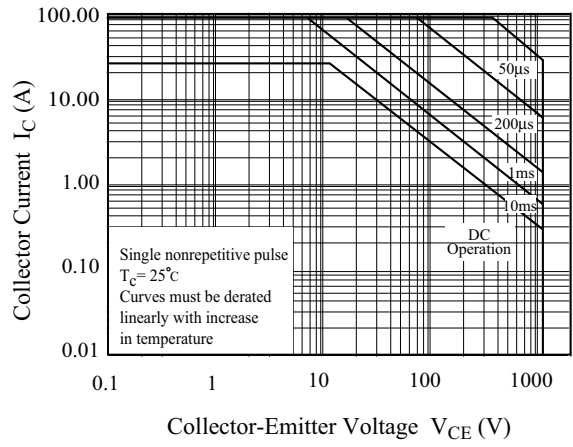


Fig 15. Turn-Off SOA

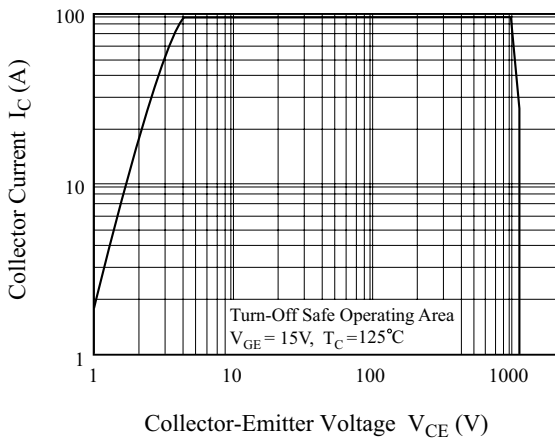
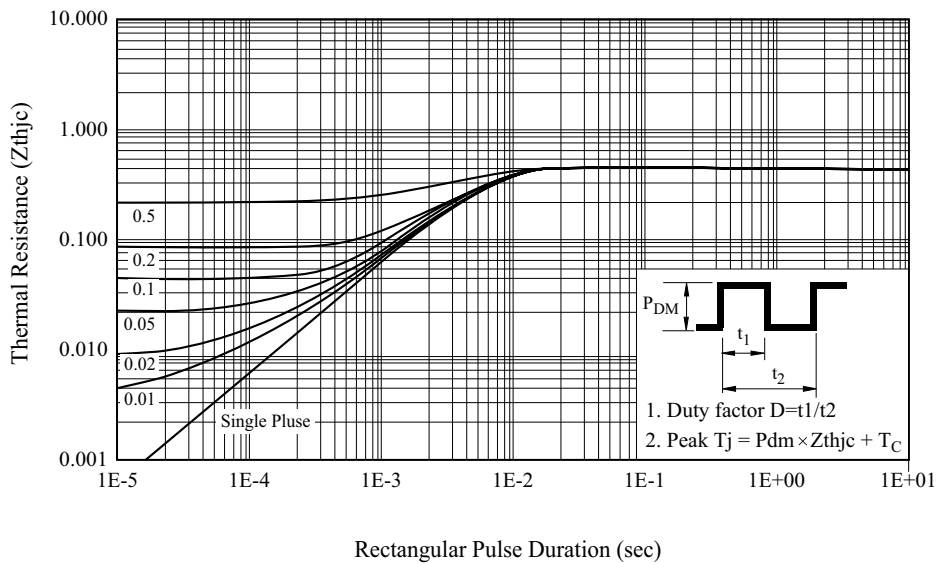


Fig 16. Transient Thermal Impedance of IGBT



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Typical Performance Characteristics

Fig 17. Forward Characteristics

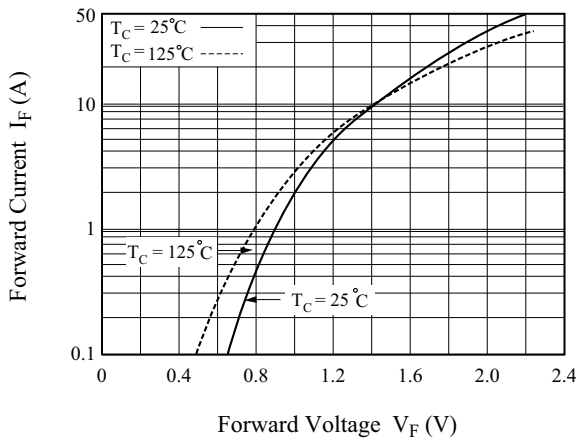


Fig 18. Reverse Recovery Current

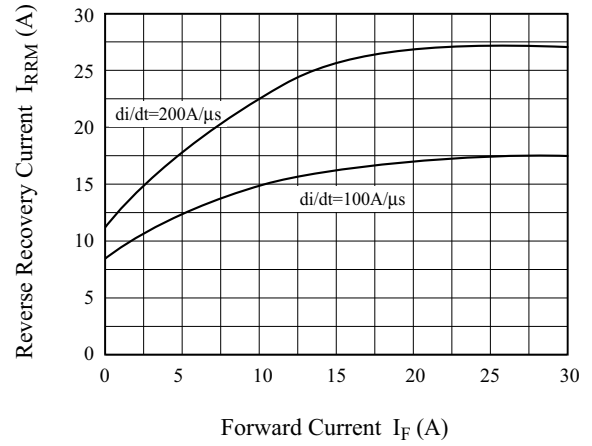
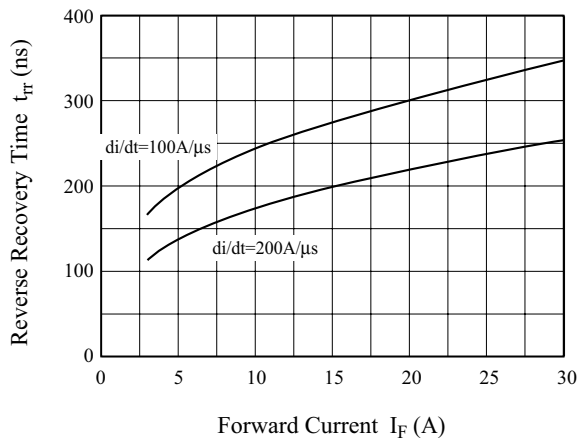


Fig 19. Reverse Recovery Time



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Definition Switching Time & Loss.

Fig 21. Switching Test Circuit

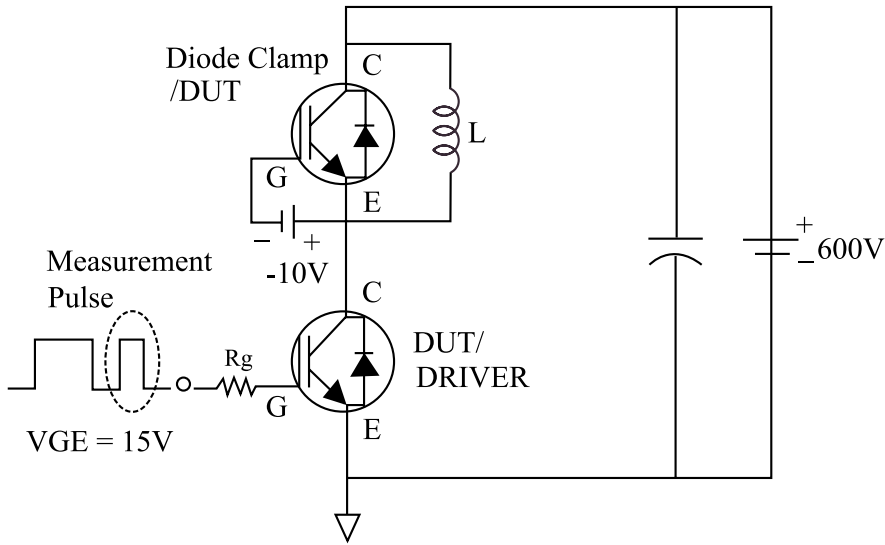


Fig 22. Definition Switching Time & Loss

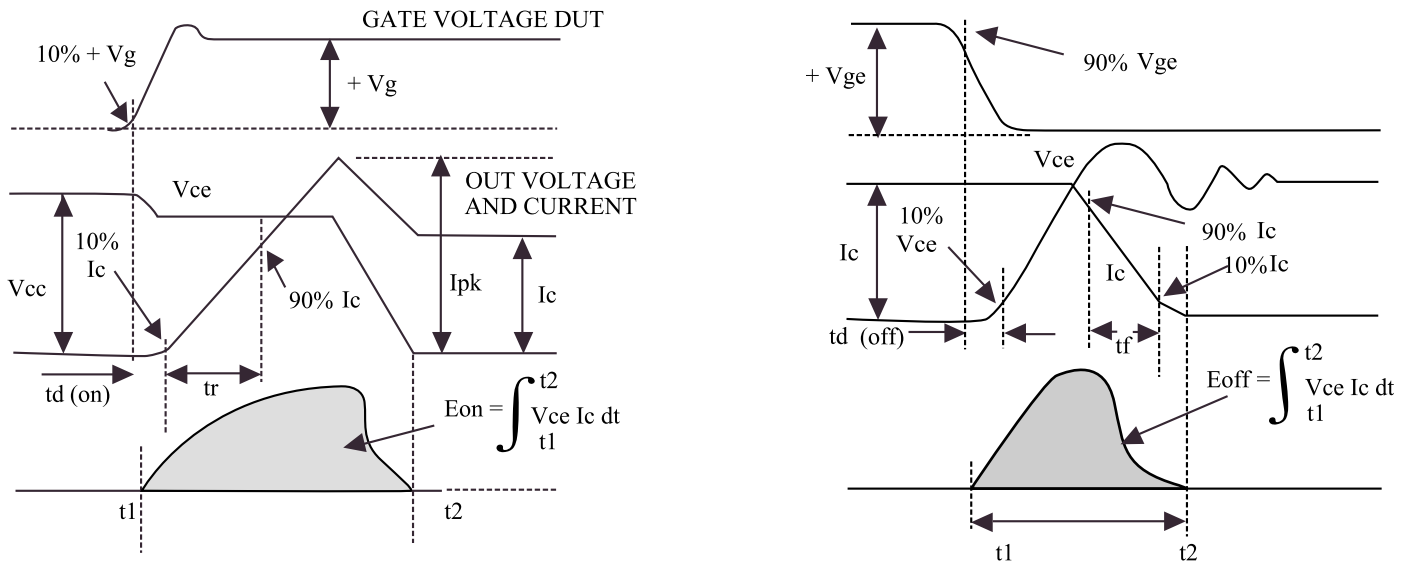


Fig 23. Definition Diode Switching Time

