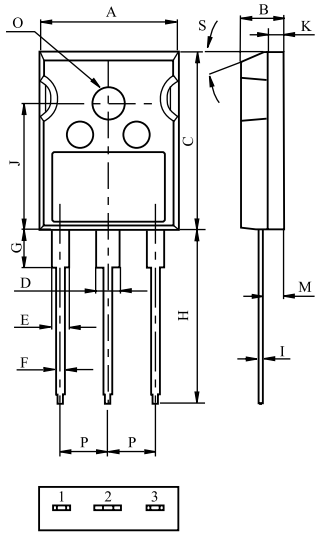
## General Description

Din-Tek Field Stop Trench IGBTs offer low switching losses, high energy efficiency and short circuit ruggedness.
It is designed for applications such as motor control, uninterrupted power supplies(UPS), general inverters.

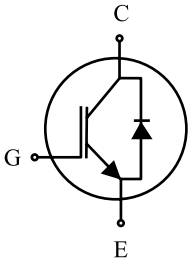


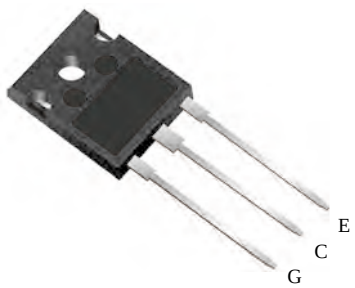

| DIM | MILLIMETERS |
|---|---|
| A | 15.90 ± 0.30 |
| B | 5.00 ± 0.20 |
| C | 20.85 ± 0.30 |
| D | 3.00 ± 0.20 |
| E | 2.00 ± 0.20 |
| F | 1.20 ± 0.20 |
| G | Max. 4.50 |
| H | 20.10 ± 0.70 |
| I | 0.60 ± 0.02 |
| J | 14.70 ± 0.20 |
| K | 2.00 ± 0.10 |
| M | 2.40 ± 0.20 |
| O | ϕ3.60 ± 0.30 |
| P | 5.45 ± 0.30 |
| Q | ϕ3.60 ± 0.20 |
| R | ϕ7.19 ± 0.10 |
| S | 20° |

TO-247

### FEATURES

- · High speed switching
- · High ruggedness, temperature stable behavior
- · Short Circuit Withstand Times 10us
- · Extremely enhanced avalanche capability




### MAXIMUM RATING (Ta=25℃)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Collector-Emitter Voltage | | $V_{CES}$ | 600 | V |
| Gate-Emitter Voltage | | $V_{GES}$ | ±20 | V |
| Collector Current | @Tc=25℃ | $I_C$ | 80 | A |
| | @Tc=100℃ | | 40 | A |
| Pulsed Collector Current | | $I_{CM}$* | 120 | A |
| Diode Continuous Forward Current | @Tc=100℃ | $I_F$ | 40 | A |
| Diode Maximum Forward Current | | $I_{FM}$ | 80 | A |
| Maximum Power Dissipation | @Tc=25℃ | $P_D$ | 250 | W |
| | @Tc=100℃ | | 100 | W |
| 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) | $R_{thJC}$ | 0.5 | ℃/W |
| Thermal Resistance, Junction to Case (DIODE) | $R_{thJC}$ | 1.0 | ℃/W |
| Thermal Resistance, Junction to Ambient | $R_{thJA}$ | 40 | ℃/W |

**ELECTRICAL CHARACTERISTICS** (Ta=25℃)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Collector-Emitter Breakdown Voltage | $BV_{CES}$ | $V_{GE}$=0V , $I_C$=250 μA | 600 | - | - | V |
| Collector Cut-off Current | $I_{CES}$ | $V_{GE}$=0V, $V_{CE}$=600V | - | - | 250 | μA |
| Gate Leakage Current | $I_{GES}$ | $V_{CE}$=0V, $V_{GE}$=±20V | - | - | ±100 | nA |
| Gate Threshold Voltage | $V_{GE(th)}$ | $V_{GE}$=$V_{CE}$, $I_C$=4mA | 4.5 | 5.5 | 7 | V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}$=15V, $I_C$=40A | - | 1.65 | 2.1 | V |
| | | $V_{GE}$=15V, $I_C$=80A | - | 2.25 | - | V |
| | | $V_{GE}$=15V, $I_C$=40A, $T_C$ = 125℃ | - | 1.9 | - | V |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{CC}$=300V, $V_{GE}$=15V, $I_C$= 40A | - | 150 | - | nC |
| Gate-Emitter Charge | $Q_{ge}$ | | - | 25 | - | nC |
| Gate-Collector Charge | $Q_{gc}$ | | - | 80 | - | nC |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{CC}$=300V, $I_C$=40A, $V_{GE}$=15V,$R_G$=10Ω Inductive Load, $T_C$ = 25℃ (Note 1) | - | 50 | - | ns |
| Rise Time | $t_r$ | | - | 35 | - | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 200 | - | ns |
| Fall Time | $t_f$ | | - | 35 | - | ns |
| Turn-On Switching Loss | $E_{on}$ | | - | 0.85 | 1.15 | mJ |
| Turn-Off Switching Loss | $E_{off}$ | | - | 0.65 | 0.85 | mJ |
| Total Switching Loss | $E_{ts}$ | | - | 1.5 | 2.0 | mJ |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{CC}$=300V, $I_C$=40A, $V_{GE}$=15V, $R_G$=10Ω Inductive Load, $T_C$ = 125℃ (Note 1) | - | 50 | - | ns |
| Rise Time | $t_r$ | | - | 40 | - | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 220 | - | ns |
| Fall Time | $t_f$ | | - | 50 | - | ns |
| Turn-On Switching Loss | $E_{on}$ | | - | 0.9 | - | mJ |
| Turn-Off Switching Loss | $E_{off}$ | | - | 0.9 | - | mJ |
| Total Switching Loss | $E_{ts}$ | | - | 1.8 | - | mJ |
| Input Capacitance | $C_{ies}$ | $V_{CE}$=30V, $V_{GE}$=0V, f=1MHz | - | 3100 | 4000 | pF |
| Ouput Capacitance | $C_{oes}$ | | - | 220 | - | pF |
| Reverse Transfer Capacitance | $C_{res}$ | | - | 120 | - | pF |
| Short Circuit Withstand Time | $t_{sc}$ | $V_{CC}$=300V, $V_{GE}$=15V, $T_C$=100℃ | 10 | - | - | μs |

Note 1 : Energy loss include tail current and diode reverse recovery.

**ELECTRICAL CHARACTERISTIC OF DIODE**

| CHARACTERISTIC | SYMBOL | TEST CONDITION | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Diode Forward Voltage | $V_F$ | $I_F$ = 40A | $T_C$=25°C | - | 1.7 | 2.5 | V |
| | | | $T_C$=125°C | - | 1.75 | - | |
| Diode Reverse Recovery Time | $t_{rr}$ | $V_{CC}$=300V, $I_F$ = 40A di/dt = 600A/ μs | $T_C$=25°C | - | 90 | - | ns |
| | | | $T_C$=125°C | - | 150 | - | |
| Diode Peak Reverse Recovery Current | $I_{rr}$ | | $T_C$=25°C | - | 17 | - | A |
| | | | $T_C$=125°C | - | 20 | - | |
| Diode Reverse Recovery Charge | $Q_{rr}$ | | $T_C$=25°C | - | 0.9 | - | μC |
| | | | $T_C$=125°C | - | 1.75 | - | |

Fig 1. Saturation Voltage Characteristics

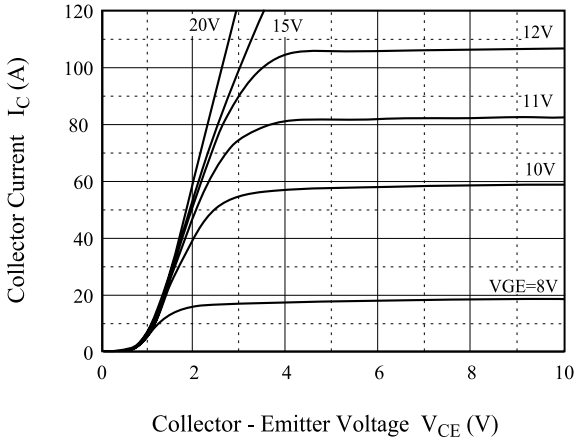



Fig 2. Saturation Voltage Characteristics

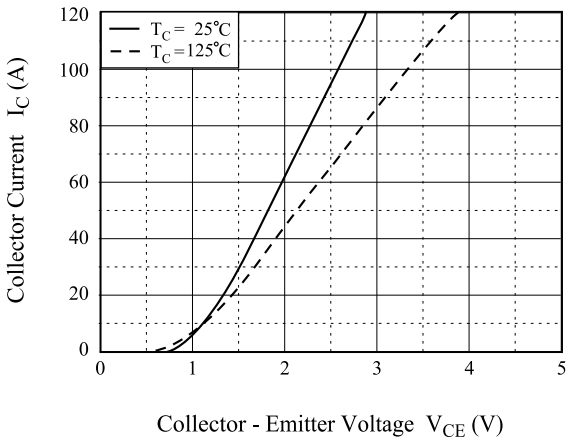



Fig 3. Saturation Voltage vs. Case Temperature

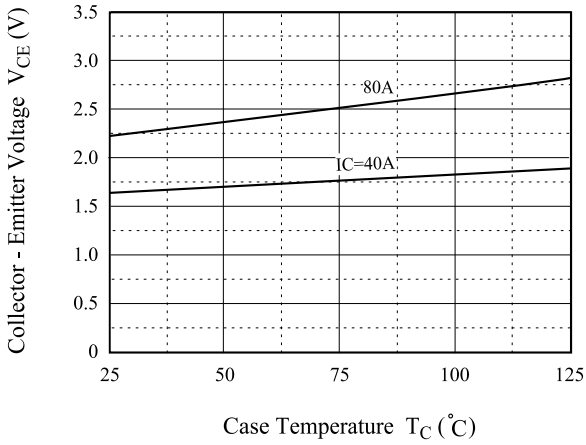



Fig 4. Saturation Voltage vs. $V_{GE}$

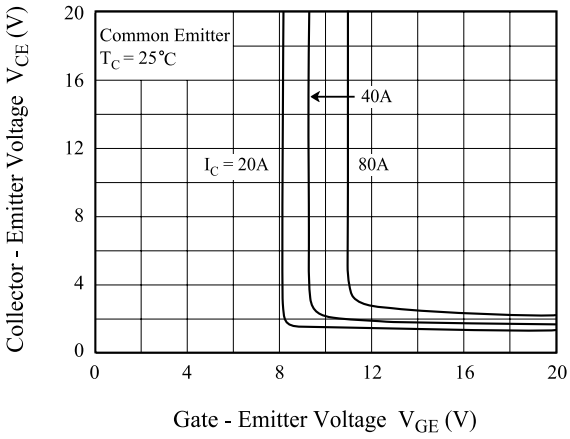



Fig 5. Saturation Voltage vs. $V_{GE}$

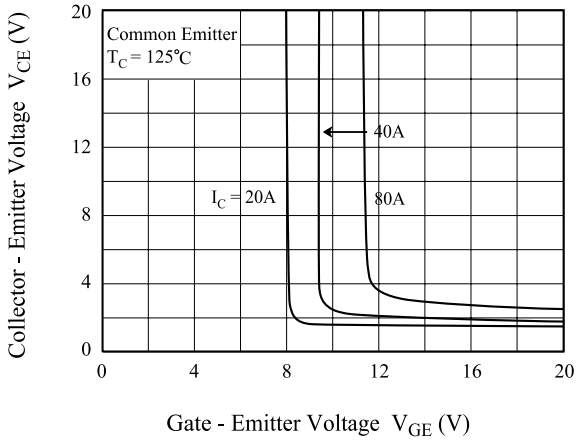



Fig 6. Capacitance Characteristics

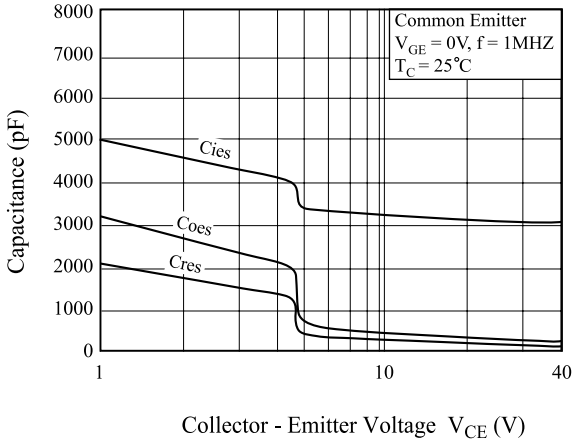


Fig 7. Turn-On Characteristics vs. Gate Resistance

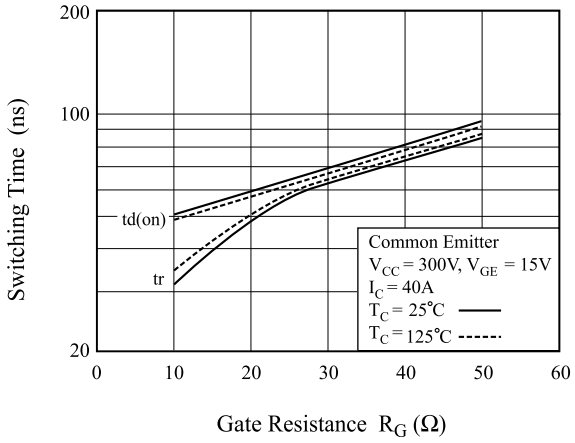



Fig 8. Turn-Off Characteristics vs. Gate Resistance

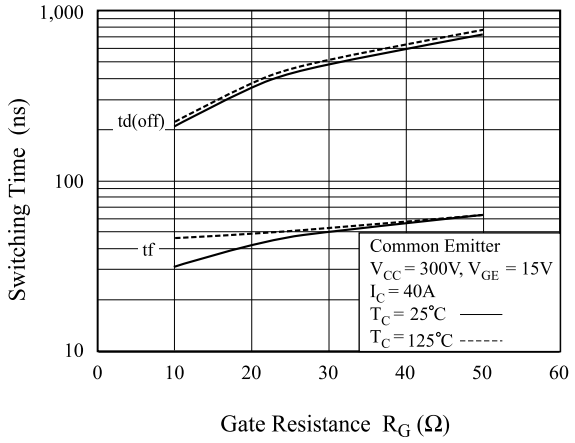



Fig 9. Switching Loss vs. Gate Resistance

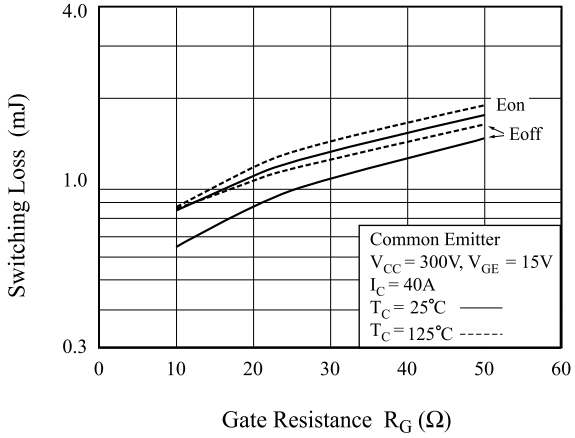



Fig 10. Turn-On Characteristics vs. Collector Current

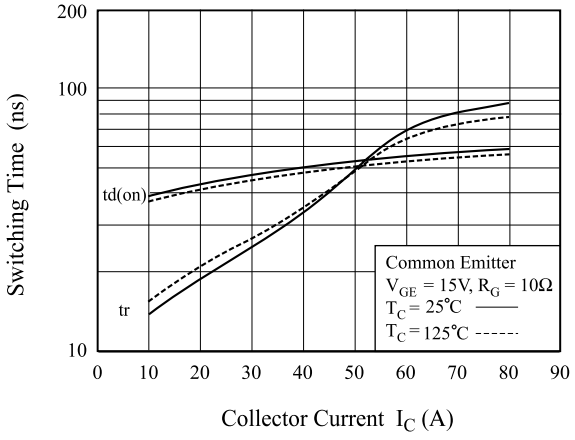



Fig 11. Turn-Off Characteristics vs. Collector Current

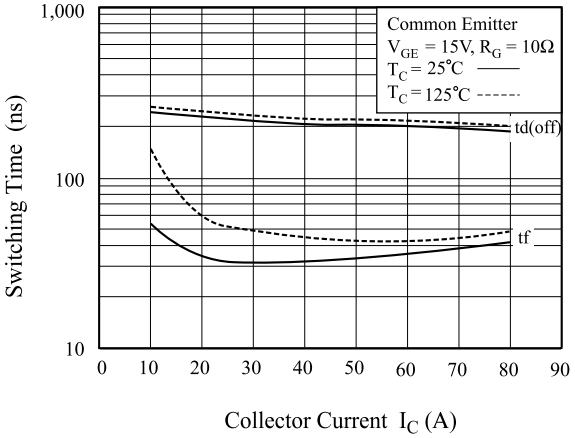



Fig 12. Switching Loss vs. Collector Current

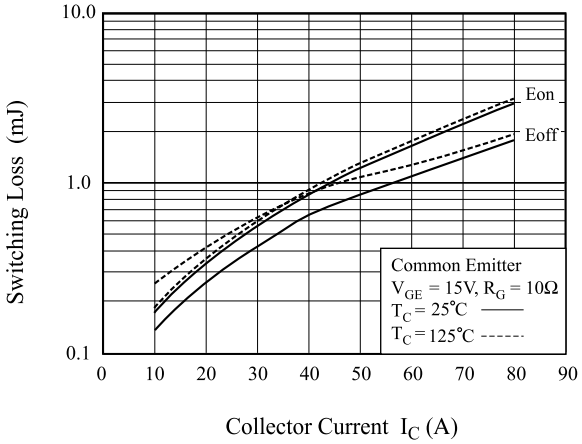


Fig 13. Gate Charge Characteristics

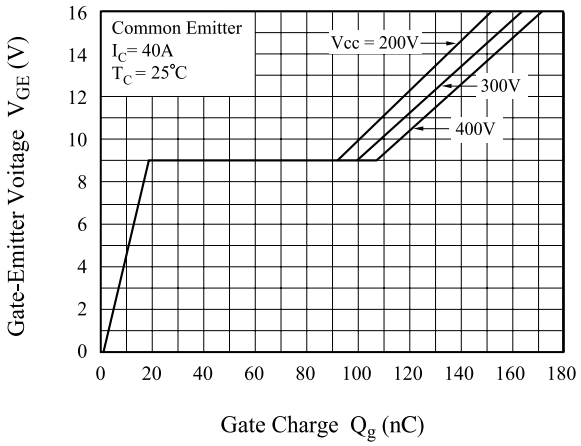



Fig 14. SOA Characteristics

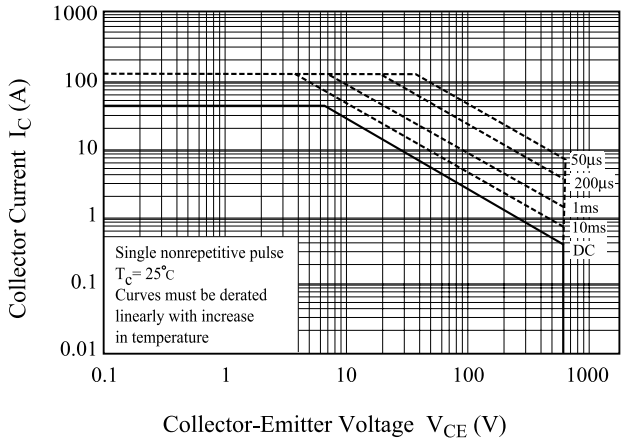



Fig 15. Turn-Off SOA

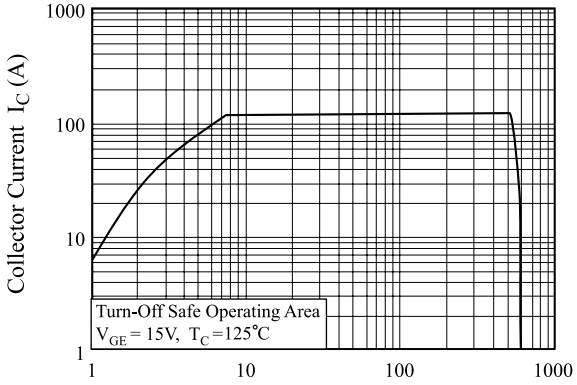



Fig 16. Transient Thermal Impedance of IGBT

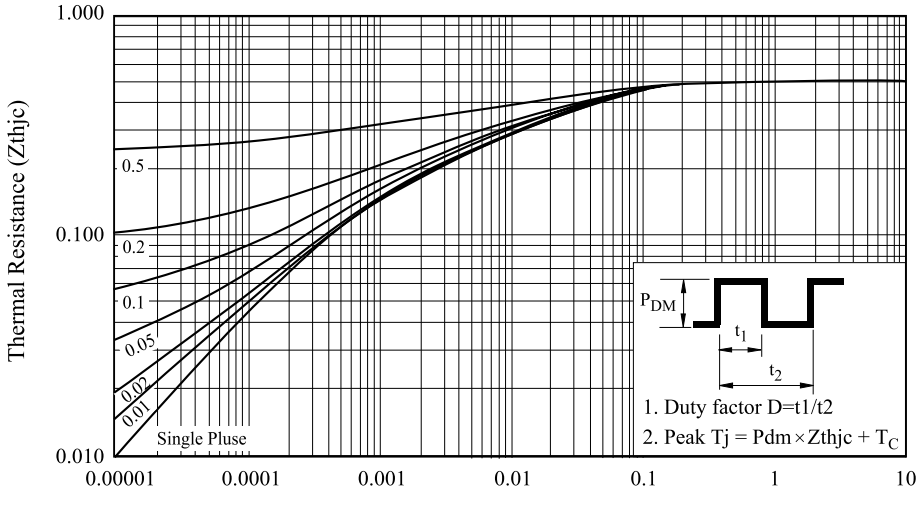


Fig 17. Forward Characteristics

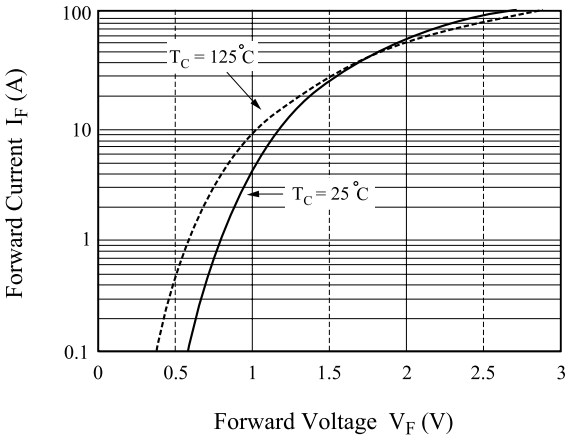



Fig 18. Reverse Recovery Current

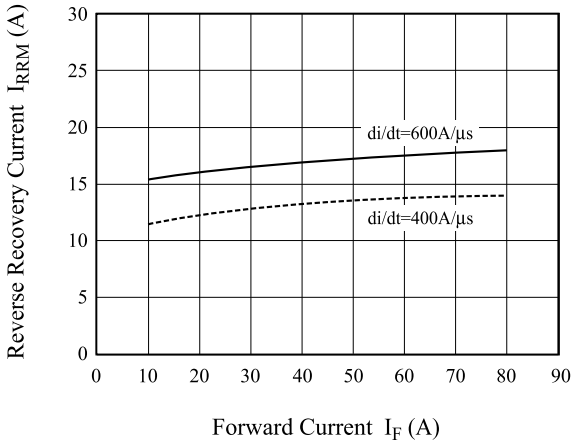



Fig 19. Reverse Recovery Time

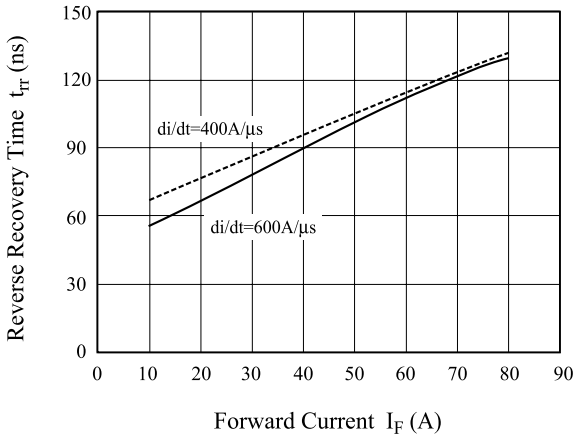


Fig 20. Switching Test Circuit

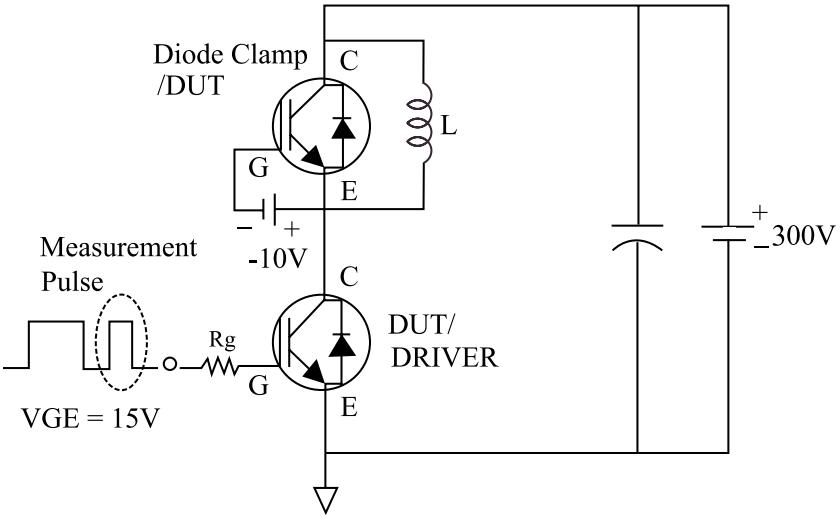
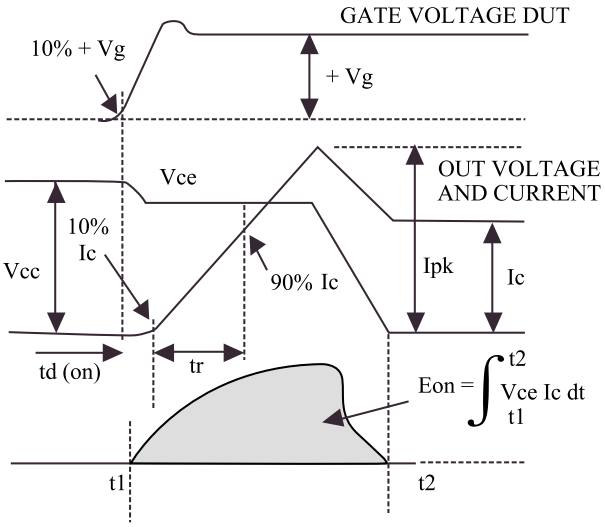



Fig 21. Definition Switching Time & Loss



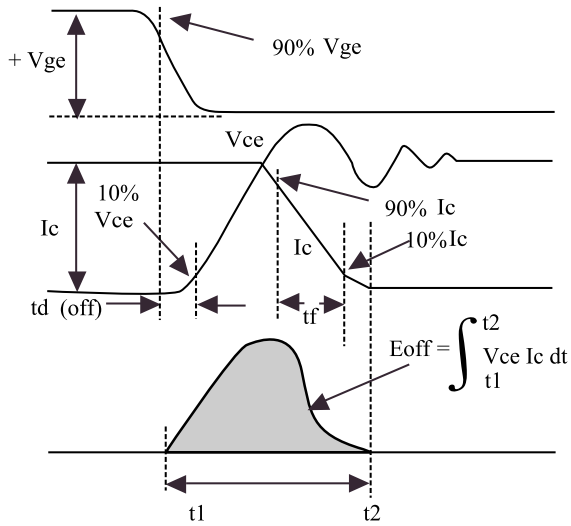
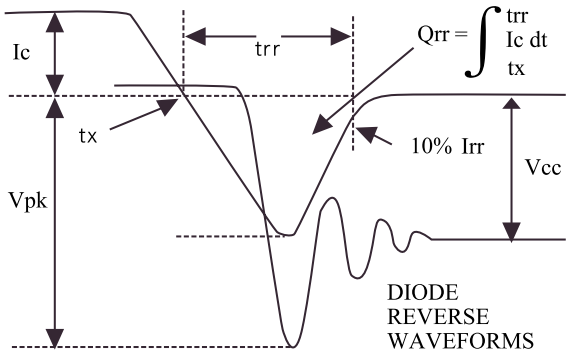
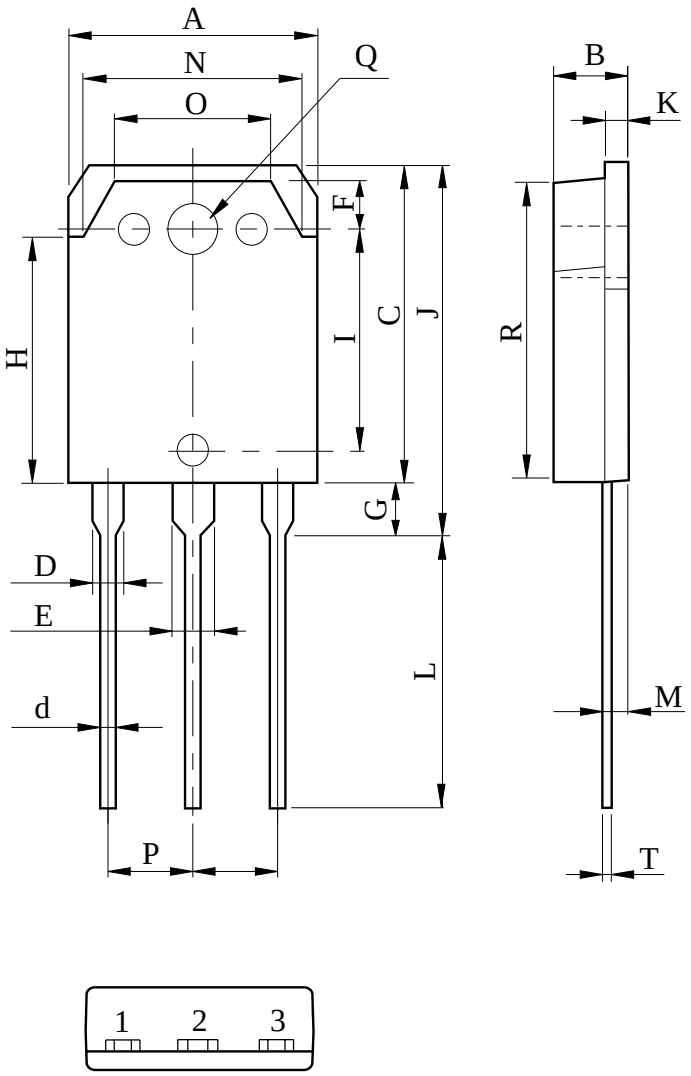




Fig 22. Definition Diode Switching Time



# TO-3P (High Voltage)




| DIM | MILLIMETERS |
|---|---|
| A | 15.60±0.20 |
| B | 4.80±0.20 |
| C | 19.90±0.20 |
| D | 2.00±0.20 |
| d | 1.00±0.20 |
| E | 3.00±0.20 |
| F | 3.80±0.20 |
| G | 3.50±0.20 |
| H | 13.90±0.20 |
| I | 12.76±0.20 |
| J | 23.40±0.20 |
| K | 1.5+0.15-0.05 |
| L | 16.50±0.30 |
| M | 1.40±0.20 |
| O | 9.60±0.20 |
| P | 5.45±0.30 |
| Q | $\phi$ 3.20±0.10 |
| R | 18.70±0.20 |
| T | 0.60+0.15-0.05 |

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**Please note that some Din-Tek documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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