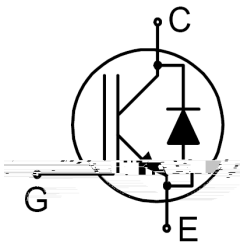
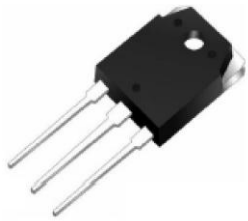
Insulated-Gate Bipolar Transistor in a TO-3P Plastic Package.

Built in fast recovery diode, Saturation voltage positive temperature coefficient, High reliability and thermal stability parameters, good agreement, RoHS product.

General purpose inverter, Frequency converters, Uninterrupted Power Supply(UPS).



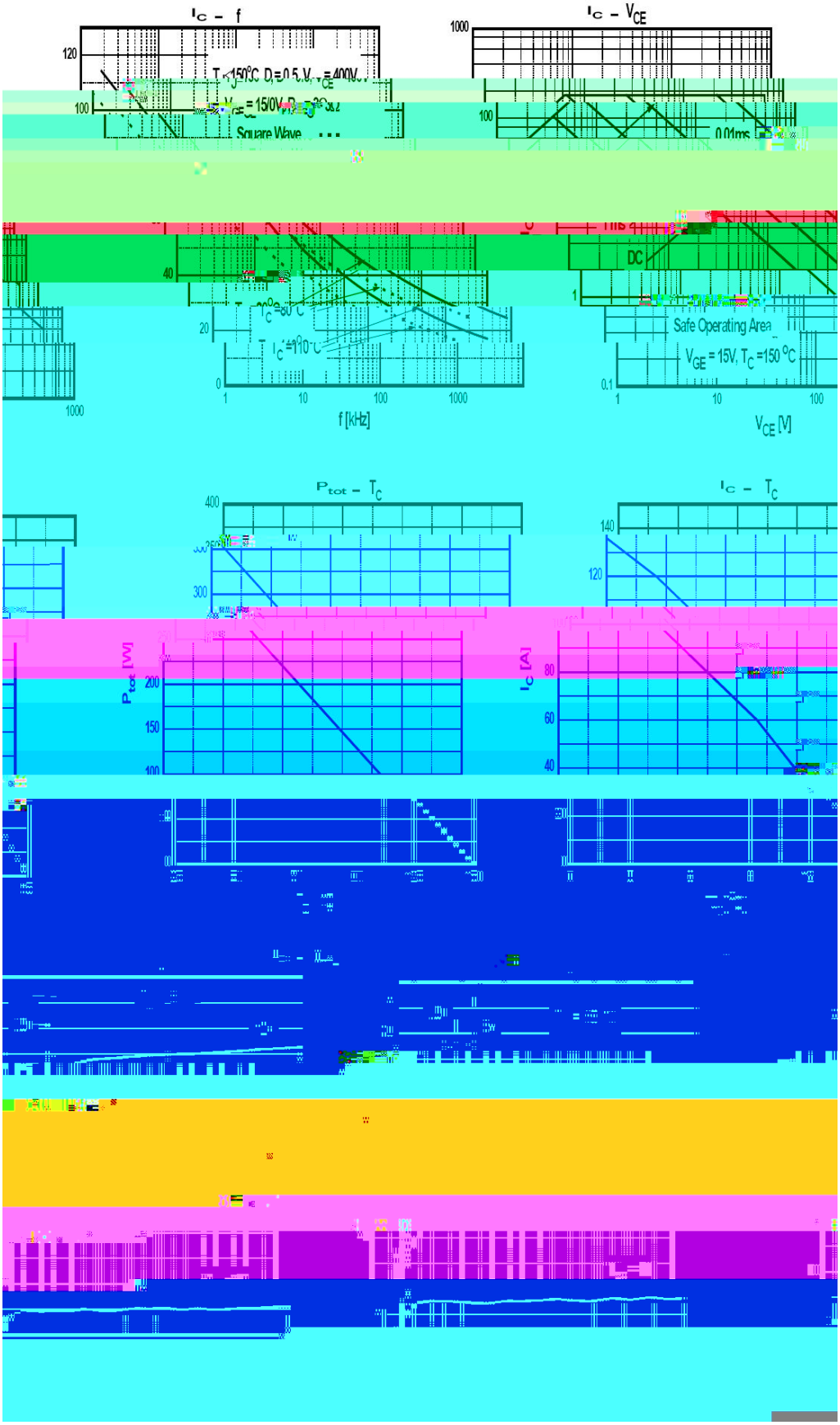
PIN1 Gate PIN 2 Collector PIN 3 Emitter

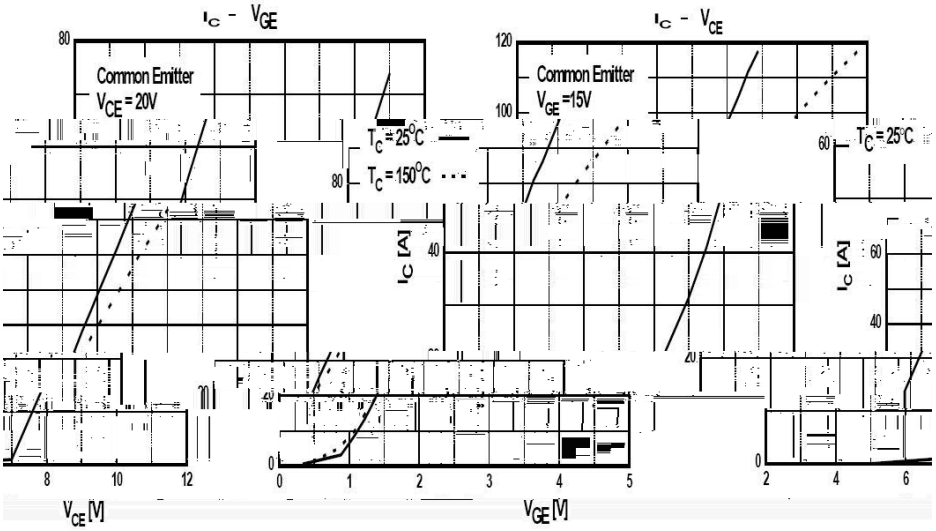
See Marking Instructions.

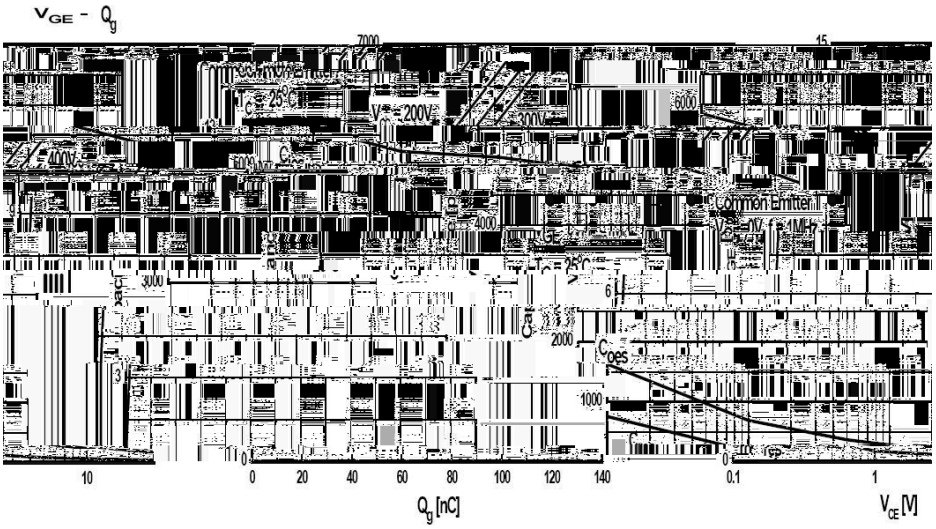
| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Collector-emitter voltage | $V_{CES}$ | 650 | V |
| Gate-emitter voltage | $V_{GES}$ | ±20 | V |
| Collector current@$T_C$=25℃ | $I_C$ | 120 | A |
| Collector current@$T_C$=100℃ | | 60 | A |
| Collector peak current, $T_P$ limited by $T_{JMAX}$ | $I_{CM}$ | 180 | A |
| Diode forward current@$T_C$=100℃ | $I_F$ | 30 | A |
| Diode maximum forward current | $I_{FM}$ | 60 | A |
| Power dissipation($T_C$=25℃) | $P_D$ | 310 | W |
| Power dissipation($T_c$=100℃) | | 125 | W |
| Operating junction and storage temperature range | $T_J$, $T_{stg}$ | -55 155 | ℃ |
| Maximum temperature for soldering | $T_L$ | 260 | ℃ |
| IGBT thermal resistance,junction-case | $R_{th(j-c)}$ | 0.4 | ℃/W |
| Diode thermal resistance,junction-case | $R_{th(j-c)}$ | 1.2 | ℃/W |
| Thermal resistance,junction-ambient | $R_{th(j-a)}$ | 40 | ℃/W |

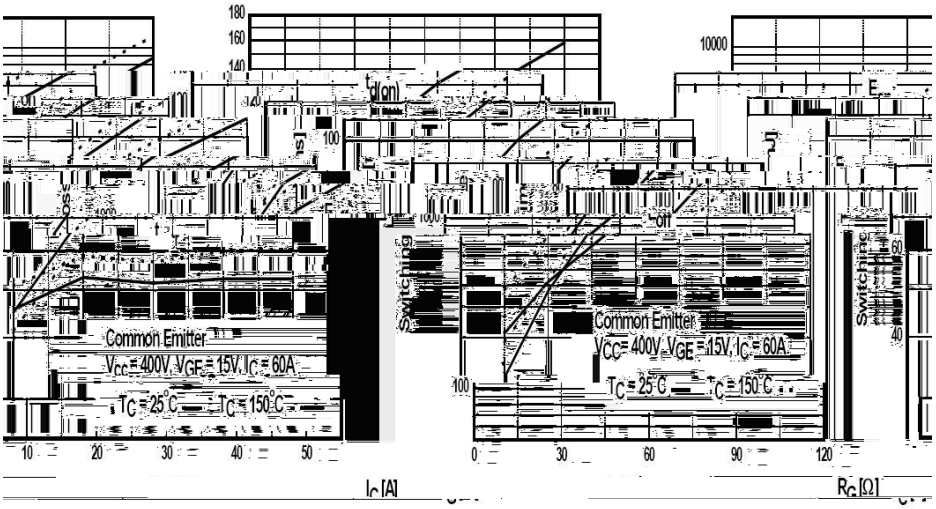
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Collector-emitter breakdown voltage | $V_{CES}$ | $V_{GE}$=0V $I_{CE}$=1.0mA | 650 | - | - | V |
| Zero gate voltage Collector current | $I_{CES}$ | $V_{GE}$=0V $V_{CE}$=650V | - | - | 4 | uA |
| Gate-body leakage current | $I_{GES}$ | $V_{GE}$=±20V $V_{CE}$=0V | - | - | ±100 | nA |
| Gate threshold voltage | $V_{GE(th)}$ | $I_C$=0.8mA $V_{CE}$=$V_{GE}$ | 5.3 | 5.7 | 6.3 | V |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C$=60A $V_{GE}$=15V | - | 2.2 | - | V |
| Input capacitance | $C_{ies}$ | $V_{CE}$=25V $V_{GE}$=0V f=1MHz | - | 5150 | - | pF |
| Output capacitance | $C_{oes}$ | | - | 300 | - | |
| Reverse transfer capacitance | $C_{res}$ | | - | 65 | - | |

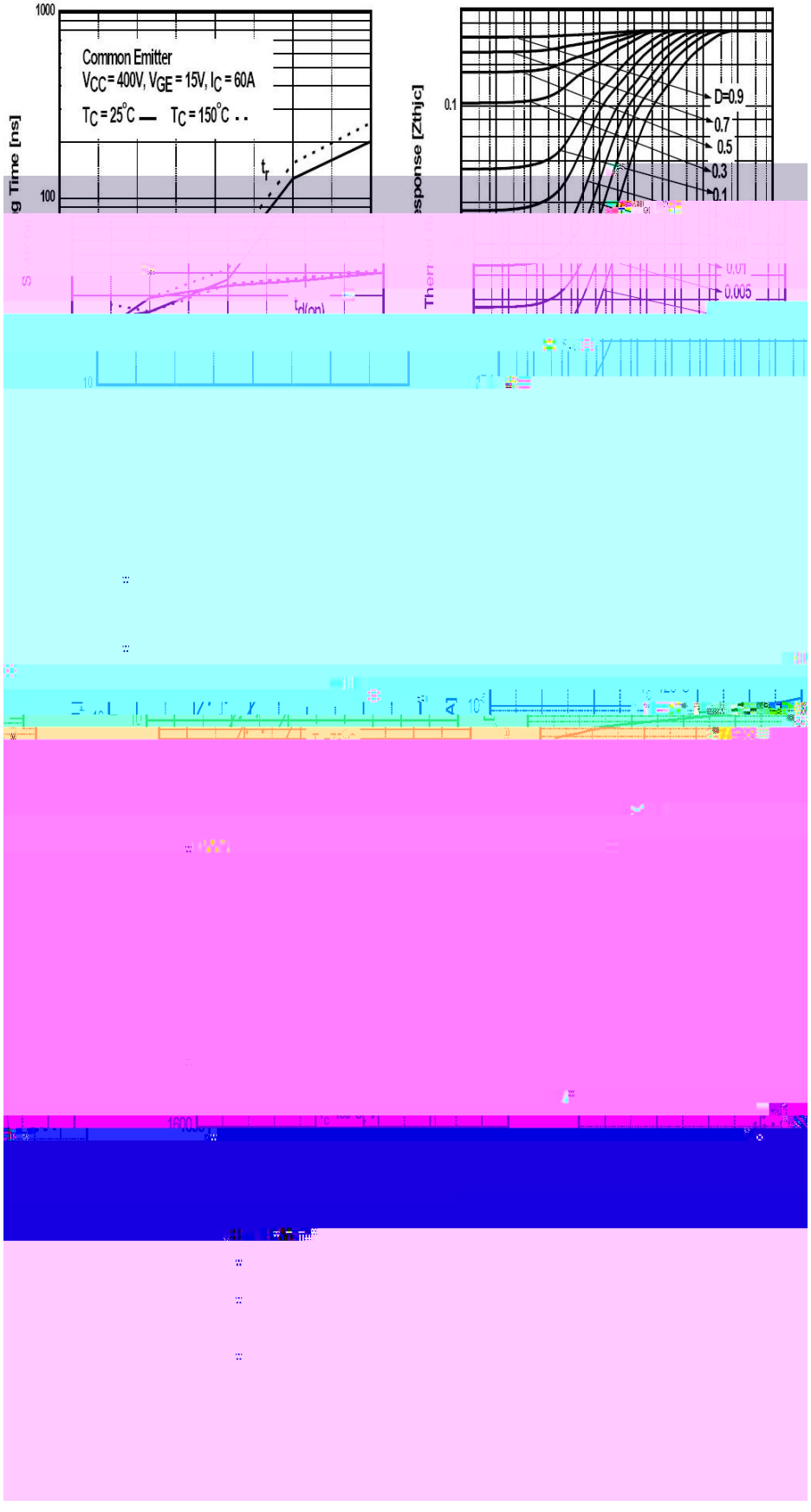
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{ies}$ | $V_{CE}$=25V $V_{GE}$=0V f=1MHz | - | 5150 | - | pF |
| Output capacitance | $C_{oes}$ | | - | 300 | - | |
| Reverse transfer capacitance | $C_{res}$ | | - | 65 | - | |
| Turn-on delay time | $t_{d(ON)}$ | $V_{CE}$=400V $I_C$=60A, $R_G$=3Ω VGE=0/15V Inductive Load | - | 35 | - | ns |
| Rise time | $t_r$ | | - | 35 | - | |
| Turn-off delay time | $t_{d(OFF)}$ | | - | 107 | - | |
| Fall time | $t_f$ | | - | 36 | - | |
| Turn-On Switching Loss | $E_{on}$ | | - | 2.05 | | mJ |
| Turn-Off Switching Loss | $E_{off}$ | | - | 1.11 | | |
| Total Switching Loss | $E_{ts}$ | | - | 3.16 | | |
| Total gate charge | $Q_G$ | $V_{CE}$=480V $I_C$=60A $V_{GE}$=15V | - | 135 | - | nC |
| Diode forward voltage | $V_F$ | $I_F$=60A | - | 2.54 | | V |
| Reverse recovery time | Trr | VR=400V $I_F$=30A di/dt=500A/μS | - | 60 | | ns |
| Diode Peak Reverse Recovery Current | Irr | | - | 12 | | A |
| Reverse recovery charge | Qrr | | - | 0.4 | | uC |


$I_C$ – f
$I_C$ – $V_{CE}$
Square Wave
DC
Safe Operating Area
$V_{GE}$ = 15V, $T_C$ = 150 °C
f [kHz]
$V_{CE}$ [V]
$P_{tot}$ – $T_C$
$I_C$ – $T_C$
$P_{tot}$ [W]
$I_C$ [A]

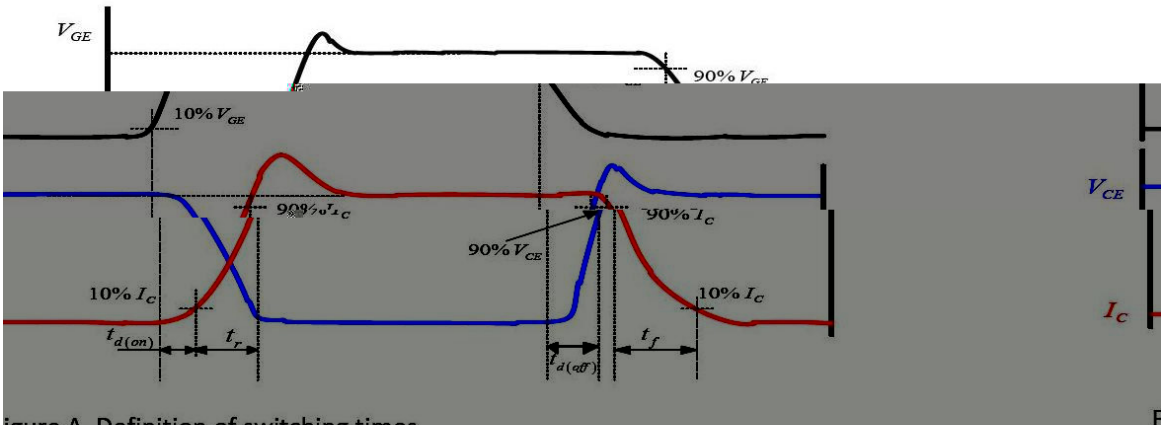

$I_C$ - $V_{GE}$
Common Emitter
$V_{CE}$ = 20V
$T_C$ = 25°C
$T_C$ = 150°C
$I_C$ [A]
$V_{CE}$ [V]
$I_C$ - $V_{CE}$
Common Emitter
$V_{GE}$ = 15V
$T_C$ = 25°C
$I_C$ [A]
$V_{GE}$ [V]


$V_{GE}$ - $Q_g$
Common Emitter
$T_C$ = 25°C
$V_{CC}$ = 200V
400V
$C_{ies}$
$C_{res}$
$C_{oes}$
$Q_g$ [nC]
$V_{CE}$ [V]


Common Emitter
$V_{CC}$ = 400V, $V_{GE}$ = 15V, $I_C$ = 60A
$T_C$ = 25°C
$T_C$ = 150°C
Switching
$t_{d(on)}$
$t_{on}$
$t_r$
$t_{d(off)}$
$t_{off}$
$t_f$
$E_{on}$
$E_{off}$
$I_C$ [A]
$R_G$ [Ω]


1000
Common Emitter
VCC = 400V, VGE = 15V, IC = 60A
TC = 25°C — TC = 150°C - -
tr
100
g Time [ns]
esponse [Zthjc]
0.1
D=0.9
0.7
0.5
0.3
0.1
0.01
0.005
Ther
10
1600

/




igure A. Definition of switching times

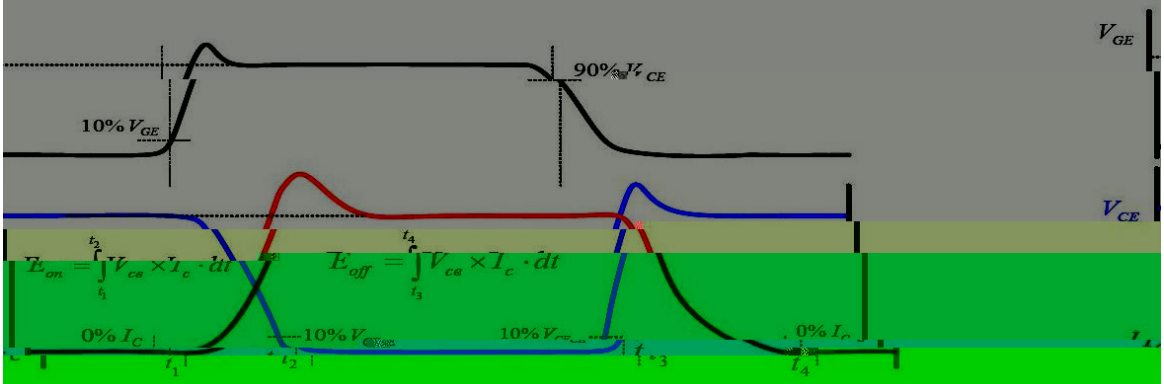
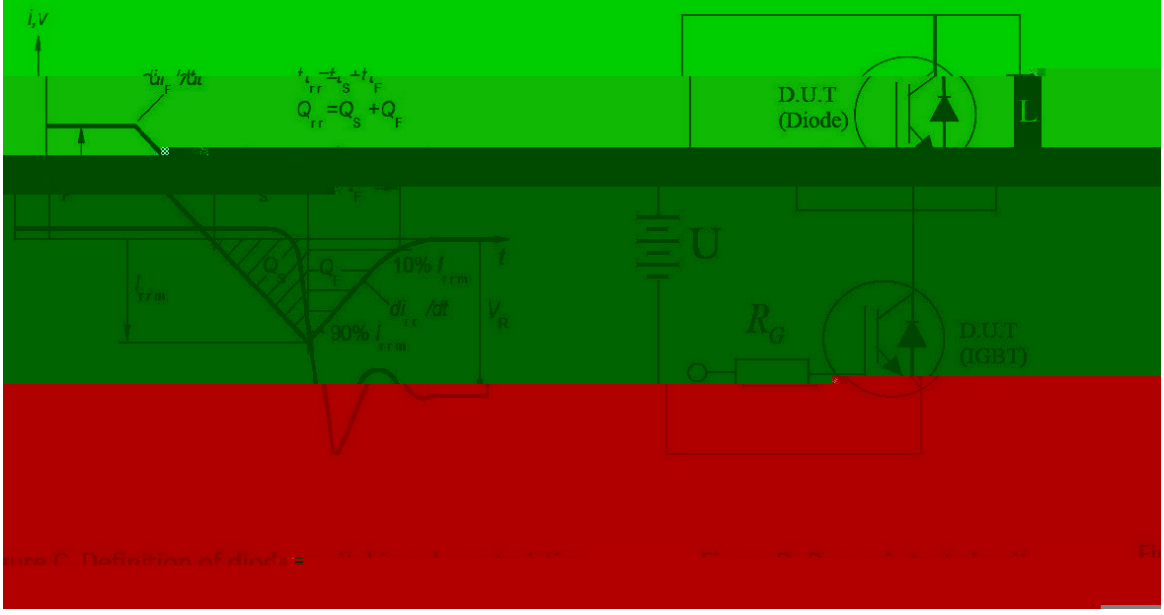
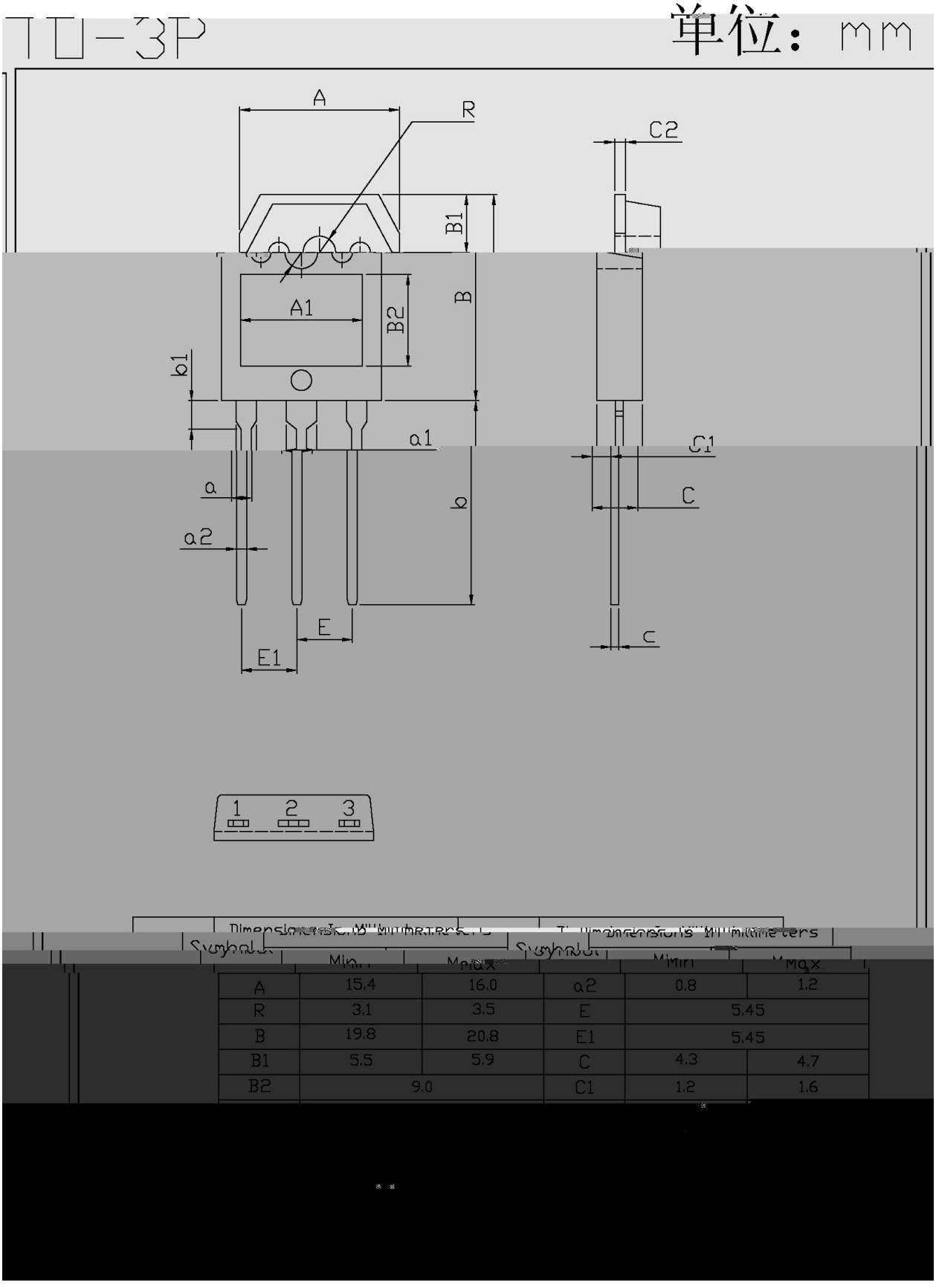



Figure B. Definition of switching losses



TO-3P 单位：mm




| Symbol | Min | Max | Symbol | Min | Max |
|---|---|---|---|---|---|
| A | 15.4 | 16.0 | a2 | 0.8 | 1.2 |
| R | 3.1 | 3.5 | E | 5.45 | |
| B | 19.8 | 20.8 | E1 | 5.45 | |
| B1 | 5.5 | 5.9 | C | 4.3 | 4.7 |
| B2 | 9.0 | | C1 | 1.2 | 1.6 |

Note:

| | |
|---|---|
| BR: | Company Code. |
| G60N65D: | Product Type. |
| ****: | Lot No. Code, code change with Lot No. |

| | | | | | Note: |
|---|---|---|---|---|---|
| 1 | 25 | 150 | 60 | 90sec; | 1.Preheating:25~150 , Time:60~90sec. |
| 2 | 255 | 5 | 5 | 0.5sec; | 2.Peak Temp.:255 5 , Duration:5 0.5sec. |