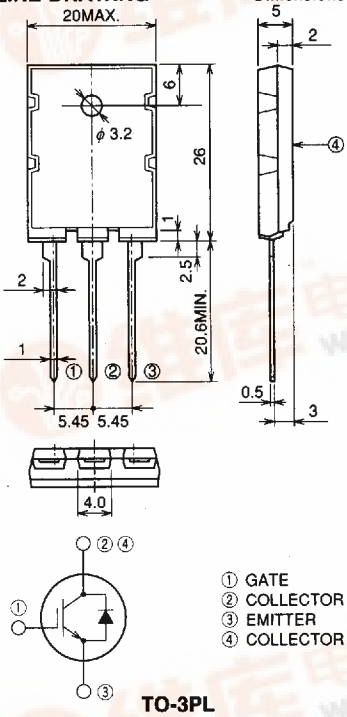
# CT60AM-20

RESONANT INVERTER USE

**CT60AM-20**

- $V_{CES}$ ..... 1000V
- $I_C$ ..... 60A
- Integrated Fast Recovery Diode

**OUTLINE DRAWING** Dimensions in mm




TO-3PL

## APPLICATION

Microwave ovens, electromagnetic cooking devices, rice-cookers, voltage-resonant inverter circuit electric appliances.

**MAXIMUM RATINGS** ($T_C$ = 25°C)

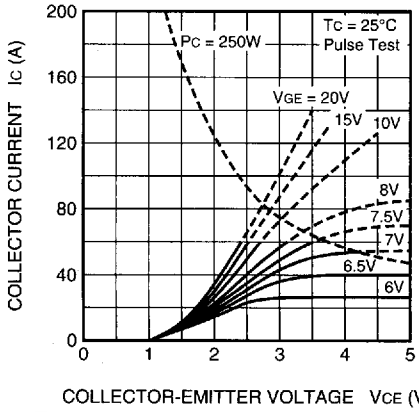
| Symbol | Parameter | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $V_{CES}$ | Collector-emitter voltage | $V_{GE}$ = 0V | 1000 | V |
| $V_{GES}$ | Gate-emitter voltage | $V_{CE}$ = 0V | ±20 | V |
| $V_{GEM}$ | Peak gate-emitter voltage | $V_{CE}$ = 0V, tw = 0.5s | ±30 | V |
| $I_C$ | Collector current | | 60 | A |
| $I_{CM}$ | Collector current (Pulsed) | tw = 1ms | 120 | A |
| $I_E$ | Emitter current | | 40 | A |
| $P_C$ | Maximum power dissipation | $T_C$ = 25°C | 250 | W |
| $T_j$ | Junction temperature | | –40 ~ +150 | °C |
| $T_{stg}$ | Storage temperature | | –40 ~ +150 | °C |

**ELECTRICAL CHARACTERISTICS** ($T_j$ = 25°C unless otherwise noted)

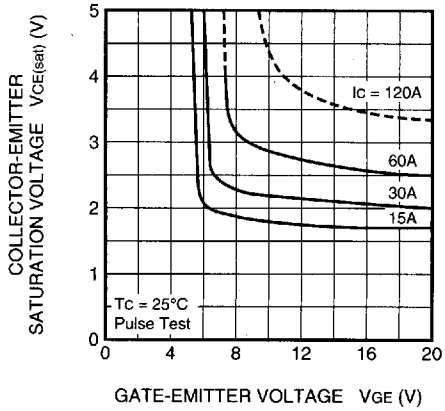
| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $I_{CES}$ | Collector current | $V_{CE}$ = 1000V, $V_{GE}$ = 0V | — | — | 1 | mA |
| $I_{GES}$ | Gate leakage current | $V_{GE}$ = ±20V, $V_{CE}$ = 0V | — | — | ±0.5 | µA |
| $V_{GE(th)}$ | Gate-emitter threshold voltage | $V_{CE}$ = 10V, $I_C$ = 6mA | 2.0 | — | 6.0 | V |
| $V_{CE(sat)}$ | Collector-emitter saturation voltage | $I_C$ = 60A, $V_{CE}$ = 15V | — | 2.6 | 3.5 | V |
| $C_{ies}$ | Input capacitance | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | — | 1950 | — | pF |
| $C_{oes}$ | Output capacitance | | — | 170 | — | pF |
| $C_{res}$ | Reverse transfer capacitance | | — | 65 | — | pF |
| $t_{d(on)}$ | Turn-on delay time | $I_C$ = 60A, Resistance load<br>$V_{CC}$ = 300V, $V_{GE}$ = 15V, $R_G$ = 25Ω | — | 0.04 | — | µs |
| $t_r$ | Fall time | | — | 0.15 | — | µs |
| $t_{d(off)}$ | Turn-off delay time | | — | 0.30 | — | µs |
| $t_f$ | Rise time | | — | 0.30 | — | µs |
| $E_{tail}$ | Tail loss | $I_{CP}$ = 60A, $T_j$ = 125°C,<br>dv/dt = 200V/µs | — | 0.6 | 1.0 | mJ/pls |
| $I_{Ctail}$ | Collector tail current | | — | 6 | 12 | A |
| $V_{EC}$ | Emitter-collector voltage | $I_E$ = 60A | — | — | 3 | V |
| $T_{rr}$ | Reverse recovery time | $I_E$ = 60A, di/dt = 20A/µs | — | 0.5 | 2 | µs |
| $R_{th(j-c)}$ | Thermal resistance (IGBT part) | Junction to case | — | — | 0.5 | °C/W |
| $R_{th(j-c)}$ | Thermal resistance | Junction to case | — | — | 4.0 | °C/W |

**PERFORMANCE CURVES**

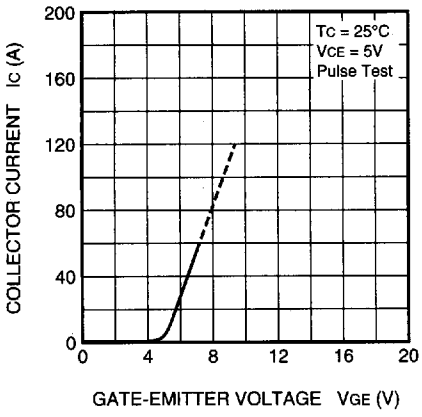
**OUTPUT CHARACTERISTICS (TYPICAL)**



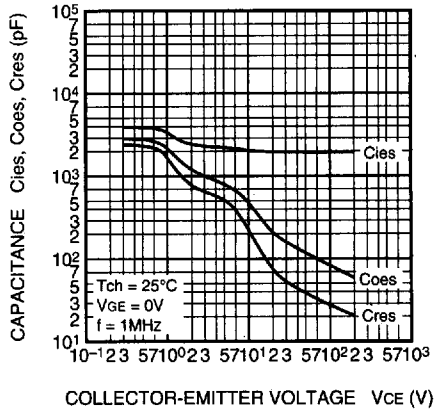

**COLLECTOR-EMITTER SATURATION VOLTAGE VS.GATE-EMITTER VOLTAGE (TYPICAL)**



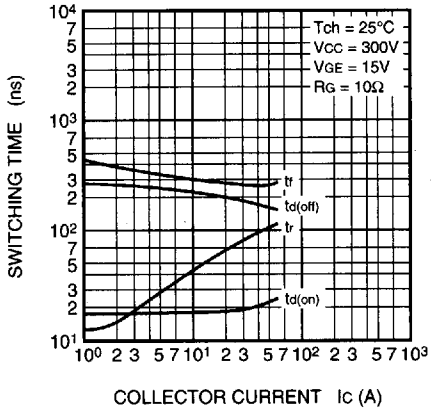
**COLLECTOR CURRENT VS. GATE-EMITTER VOLTAGE (TYPICAL)**



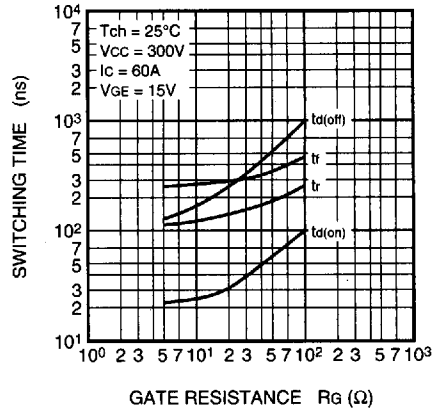

**CAPACITANCE VS. COLLECTOR-EMITTER VOLTAGE (TYPICAL)**



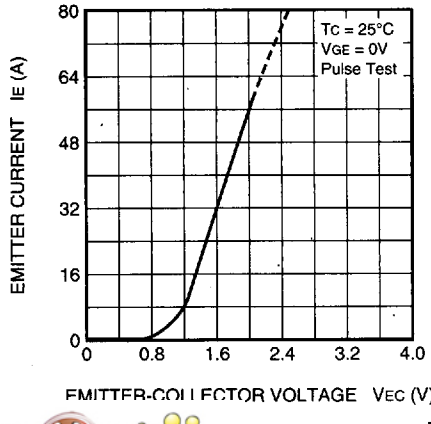

**SWITCHING CHARACTERISTICS (TYPICAL)**




**SWITCHING TIME VS.GATE RESISTANCE (TYPICAL)**




**TRANSFER CHARACTERISTICS (TYPICAL)**

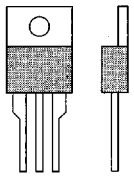
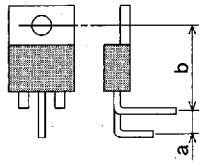
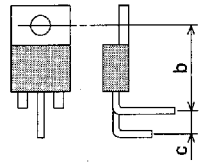
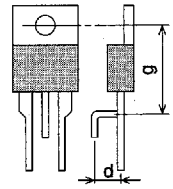
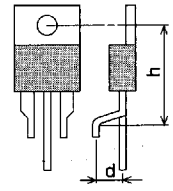
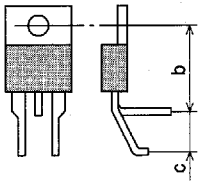
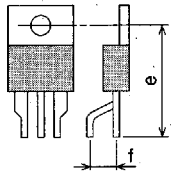
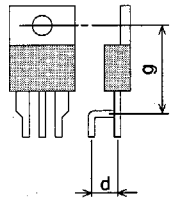
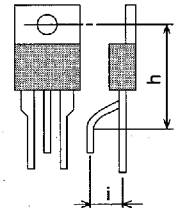


# LEAD FORMING OUTLINE AND TAPING

## LEAD FORMING

(1) TO-220 outline

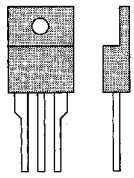
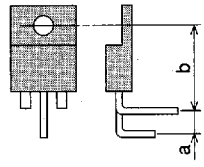
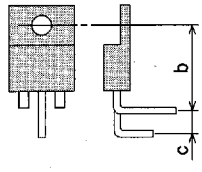
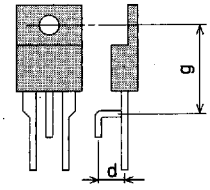
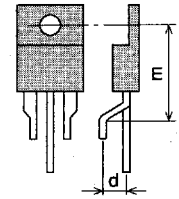
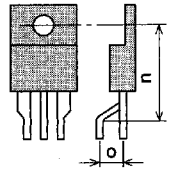
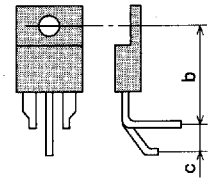
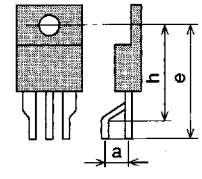
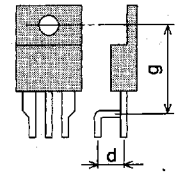
| Applicable device | FS＊＊UM-＊＊A |
|---|---|

| Standard outline | Standard forming outline | | | |
|---|---|---|---|---|
| | A5 | A6 | A8 | AA |
|  |  |  |  |  |
| AJ | AN | AS | AT | |
|  |  |  |  | |

| Dimensions | a=3.0±0.5, b=14.7±0.5, c=5.0±0.5, d=4.5±0.5, e=20.1±0.5, f=3.0±0.5, g=15.5±0.5<br>h=16.0±0.5, i=5.5±0.5<br>※Dimensions measured during processing | Unit : mm |
|---|---|---|

(1) TO-220 full molded outline

| Applicable device | FS＊＊KM-＊＊A |
|---|---|

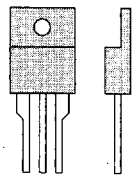
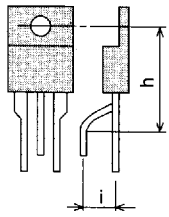
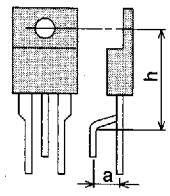
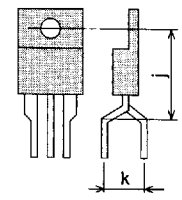
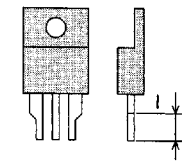
| Standard outline | Standard forming outline | | | |
|---|---|---|---|---|
| | A5 | A6 | A8 | AA |
|  |  |  |  |  |
| AG | AH | AN | AS | |
|  |  |  |  | |

| Dimensions | a=3.0±0.5, b=14.7±0.5, c=5.0±0.5, d=4.5±0.5, e=20.1±0.5, g=15.5±0.5, h=16.0±0.5,<br>i=5.5±0.5, j=19.0±0.5, k=7.75±0.5, l=4.0±0.5, m=15.1±0.5, n=16.5±0.5, 0=3.8±0.35<br>※Dimensions measured during processing | Unit : mm |
|---|---|---|

# LEAD FORMING OUTLINE AND TAPING

(2) TO-220 full molded outline

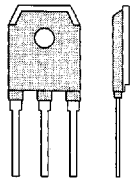
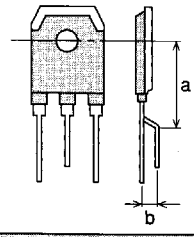
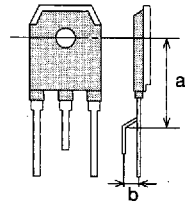
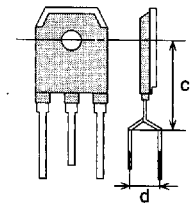
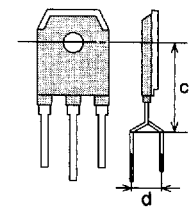
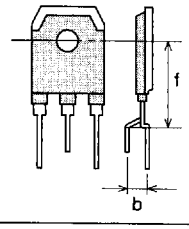
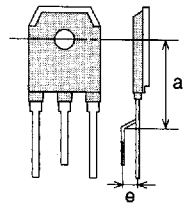
| Applicable device | FS＊＊KM-＊＊A |
|---|---|

| Standard outline | Standard forming outline | | | |
|---|---|---|---|---|
| | AT | AU | AV | AW |
|  |  |  |  |  |

| Dimensions | a=3.0±0.5, b=14.7±0.5, c=5.0±0.5, d=4.5±0.5, e=20.1±0.5, g=15.5±0.5, h=16.0±0.5, i=5.5±0.5, j=19.0±0.5, k=7.75±0.5, l=4.0±0.5, m=15.1±0.5, n=16.5±0.5, 0=3.8±0.35<br>※Dimensions measured during processing | Unit : mm |
|---|---|---|

(3) TO-3P outline

| Applicable device | FS＊＊SM-＊＊A・CT＊＊SM-＊＊ |
|---|---|

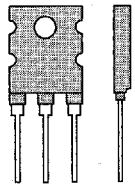
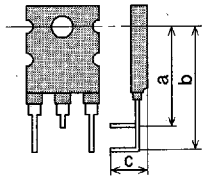
| Standard outline | Standard forming outline | | | |
|---|---|---|---|---|
| | A7 | A8 | A9 | AB |
|  |  |  |  |  |
| | AF | AN | | |
| |  |  | | |

| Dimensions | a=23.5, b=5.45, c=23, d=9.5, e=4, f=21.5<br>※Dimensions measured during processing | Unit : mm |
|---|---|---|

# LEAD FORMING OUTLINE AND TAPING

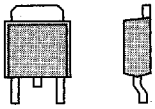
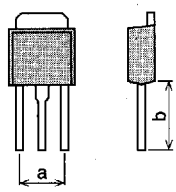
(4) TO-3PL outline

| Applicable device | CT＊＊AM-＊＊＊ |
|---|---|

| Standard outline | Standard forming outline AC | Dimensions | Unit : mm |
|---|---|---|---|
|  |  | | a=24±0.5<br>b=31.5±0.5<br>c=13.3±0.6<br>※Dimensions measured during processing |

(5) MP-3 outline

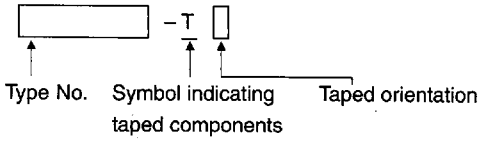
| Applicable device | FS＊＊AS-＊＊A・CT20A＊＊-8 |
|---|---|

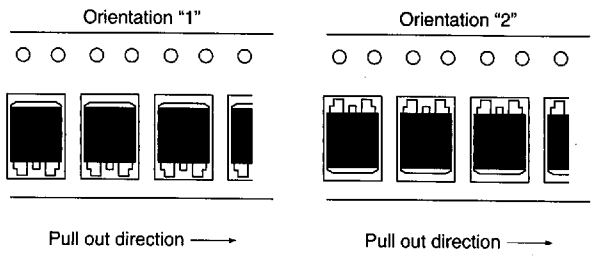
| Standard outline | Standard forming outline A1 | Dimensions | Unit : mm |
|---|---|---|---|
|  |  | | a=4.6<br>b=14min.<br>※Dimensions measured during processing |

# LEAD FORMING OUTLINE AND TAPING

## TAPING
### (1) TO-220S

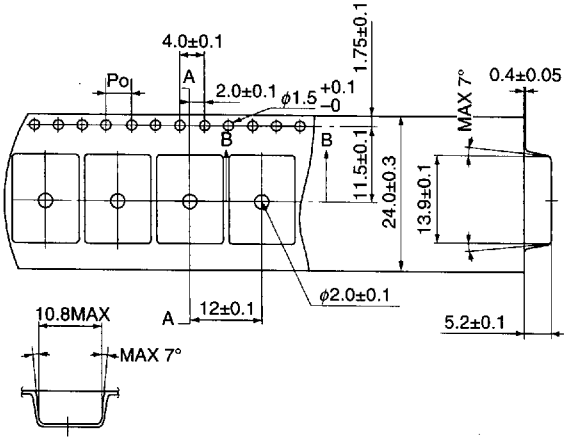
(a) Marking



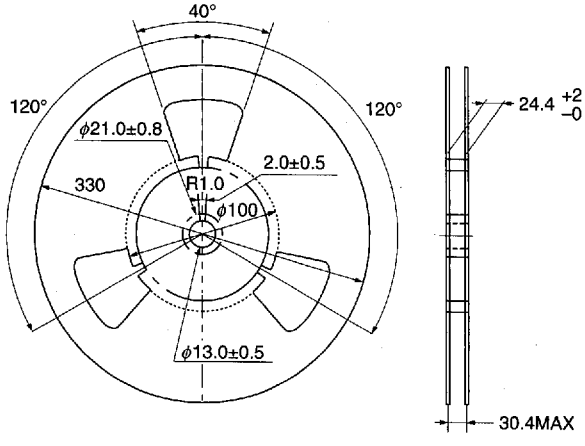

(b) Taping

• Tape shape and dimensions




Notice : The cumulative pitch error of Po (Free hole pitch) is ± 0.2mm per 10 pitches.

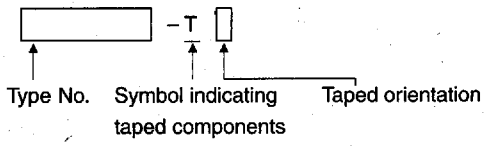
• Reel shape and dimensions

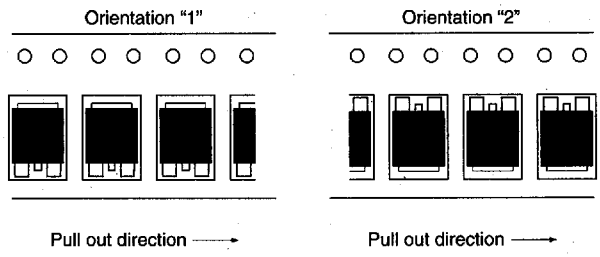


# LEAD FORMING OUTLINE AND TAPING

## (2) MP-3

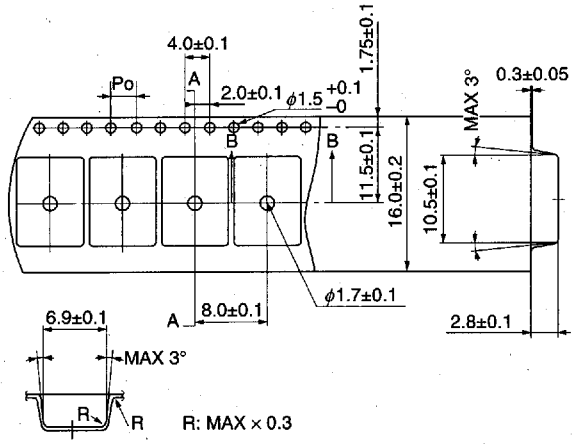
(a) Marking



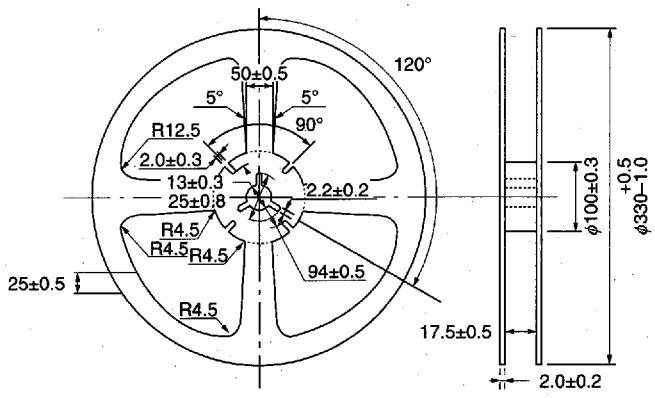

(b) Taping

• Tape shape and dimensions




Notice : The cumulative pitch error of Po (Free hole pitch) is ± 0.2mm per 10 pitches.

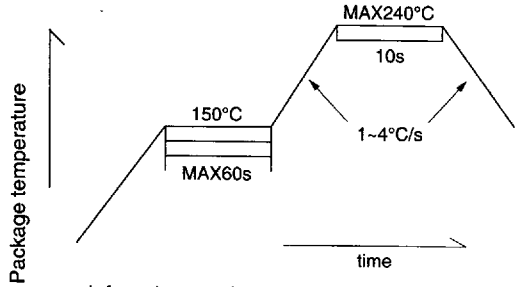
• Reel shape and dimensions



# LEAD FORMING OUTLINE AND TAPING

**Recommended conditions for surface mounting type**
**Outline : TO-220S, MP-3**

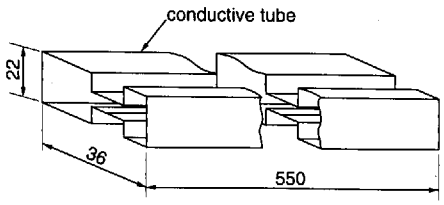
(1) Board : Alumina, Insulated metal board
(2) Solder plate thickness : 150μm~250μm
(3) Temperature profile




Infrared rays reflow temperature profile

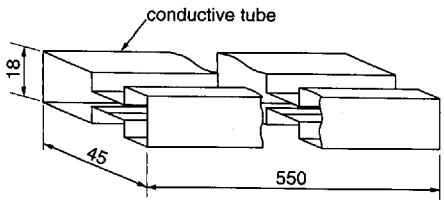
**Individual package for lead forming outline**

(1) TO-220, TO-220FN, TO-220C, TO-220S
Dimensions in (Unit : mm)




The capacity is 50 p.c.s. (max.)

(2) TO-3P
Dimensions in (Unit : mm)




The capacity is 30 p.c.s. (max.)