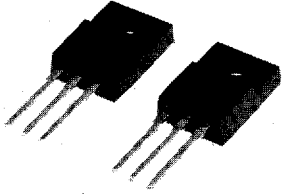


# FS12KM-5

HIGH-SPEED SWITCHING USE

## FS12KM-5



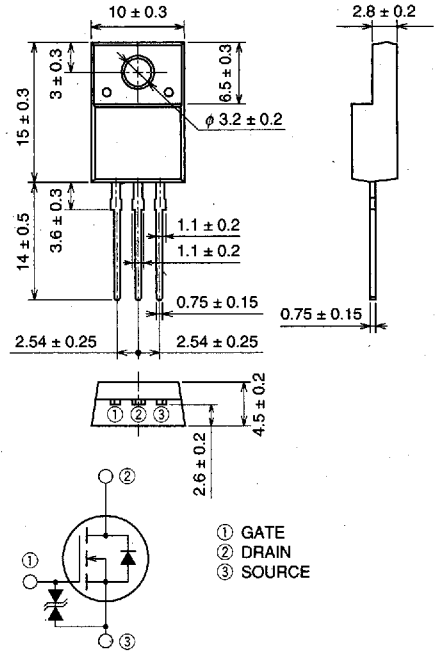
- $V_{DSS}$  ..... 250V
- $r_{DS(ON)}$  (MAX) ..... 0.40Ω
- $I_D$  ..... 12A
- $V_{iso}$  ..... 2000V

### APPLICATION

SMPS, DC-DC Converter, battery charger, power supply of printer, copier, HDD, FDD, TV, VCR, personal computer etc.

### OUTLINE DRAWING

Dimensions in mm



TO-220FN

### MAXIMUM RATINGS (Tc = 25°C)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{DSS}$	Drain-source voltage	$V_{GS} = 0V$	250	V
$V_{GSS}$	Gate-source voltage	$V_{DS} = 0V$	±30	V
$I_D$	Drain current		12	A
$I_{DM}$	Drain current (Pulsed)		36	A
$P_D$	Maximum power dissipation		35	W
$T_{ch}$	Channel temperature		-55 ~ +150	°C
$T_{stg}$	Storage temperature		-55 ~ +150	°C
$V_{iso}$	Isolation voltage	AC for 1minute, Terminal to case	2000	Vrms
—	Weight	Typical value	2.0	g

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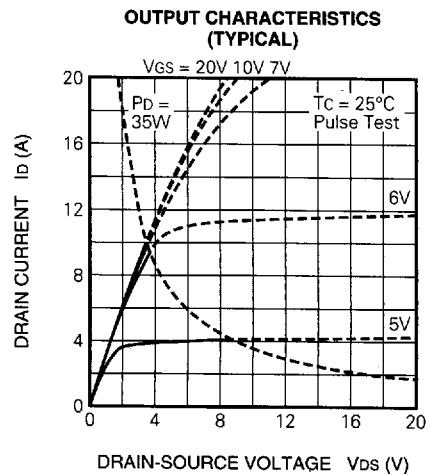
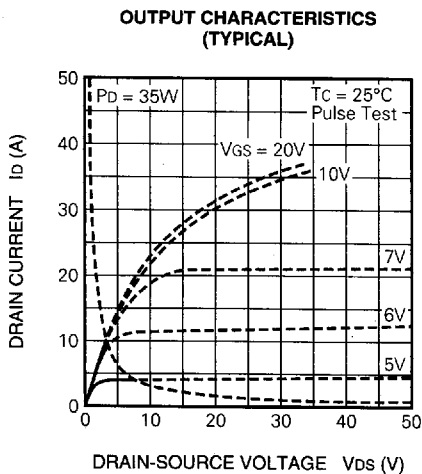
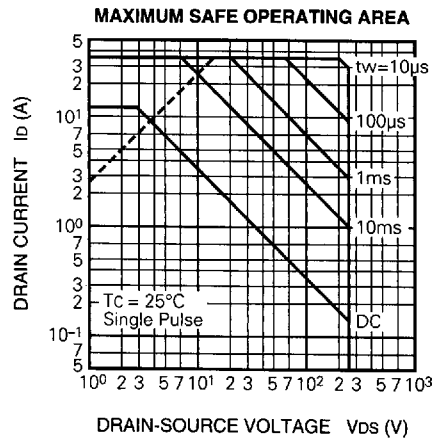
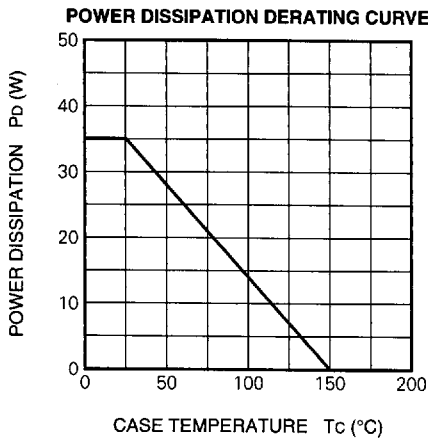
# FS12KM-5

## HIGH-SPEED SWITCHING USE

### ELECTRICAL CHARACTERISTICS (Tch = 25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V(BR)DSS	Drain-source breakdown voltage	ID = 1mA, VGS = 0V	250	—	—	V
V(BR)GSS	Gate-source breakdown voltage	IG = ±100μA, VDS = 0V	±30	—	—	V
IGSS	Gate leakage current	VGS = ±25V, VDS = 0V	—	—	±10	μA
IDSS	Drain current	VDS = 250V, VGS = 0V	—	—	1	mA
VGS(th)	Gate-source threshold voltage	ID = 1mA, VDS = 10V	2	3	4	V
rDS(ON)	Drain-source on-state resistance	ID = 6A, VGS = 10V	—	0.32	0.40	Ω
VDS(ON)	Drain-source on-state voltage	ID = 6A, VGS = 10V	—	1.90	2.40	V
yfs	Forward transfer admittance	ID = 6A, VDS = 10V	5.0	7.5	—	S
Ciss	Input capacitance	VDS = 25V, VGS = 0V, f = 1MHz	—	720	—	pF
Coss	Output capacitance		—	150	—	pF
Crss	Reverse transfer capacitance		—	30	—	pF
td(on)	Turn-on delay time	VDD = 150V, ID = 6A, VGS = 10V, RGEN = RGS = 50Ω	—	18	—	ns
tr	Rise time		—	35	—	ns
td(off)	Turn-off delay time		—	80	—	ns
tf	Fall time		—	40	—	ns
VSD	Source-drain voltage		IS = 6A, VGS = 0V	—	1.5	2.0
Rth(ch-c)	Thermal resistance	Channel to case	—	—	3.57	°C/W

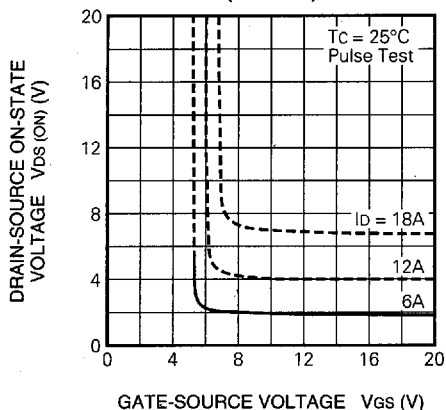
### PERFORMANCE CURVES



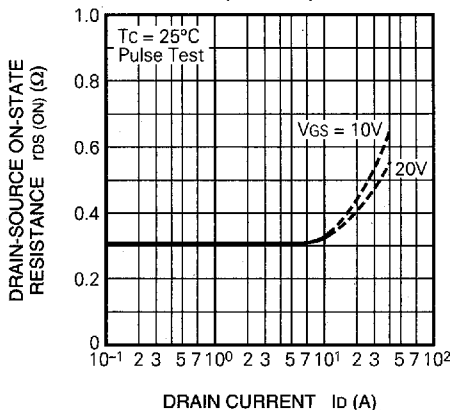
6249829 0019654 154



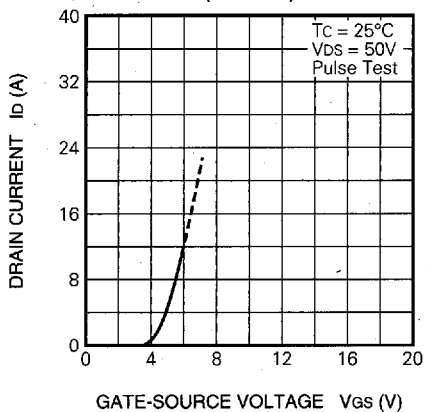
ON-STATE VOLTAGE VS. GATE-SOURCE VOLTAGE (TYPICAL)



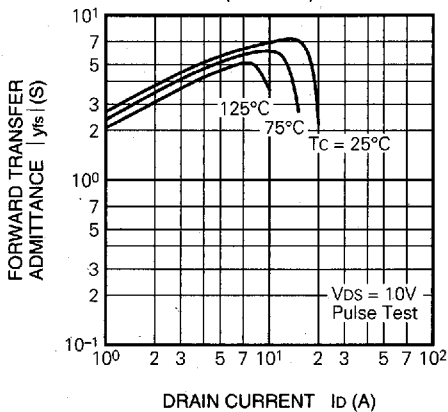
ON-STATE RESISTANCE VS. DRAIN CURRENT (TYPICAL)



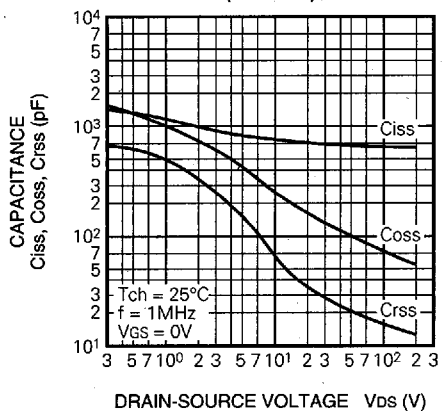
TRANSFER CHARACTERISTICS (TYPICAL)



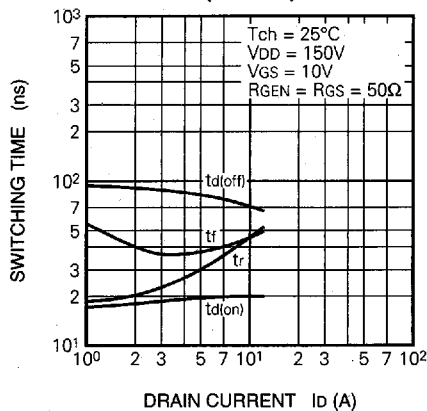
FORWARD TRANSFER ADMITTANCE VS. DRAIN CURRENT (TYPICAL)



CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)

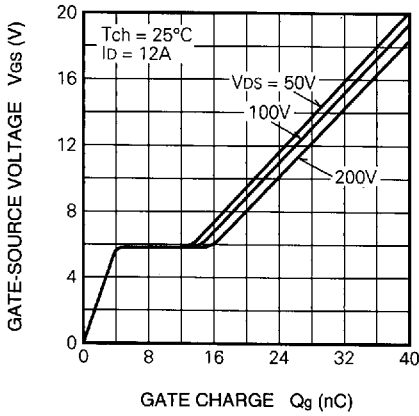


SWITCHING CHARACTERISTICS (TYPICAL)

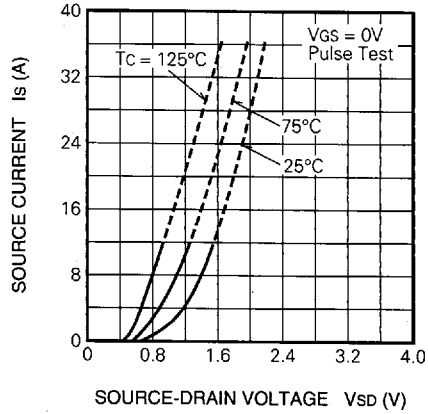


6249829 0019655 090

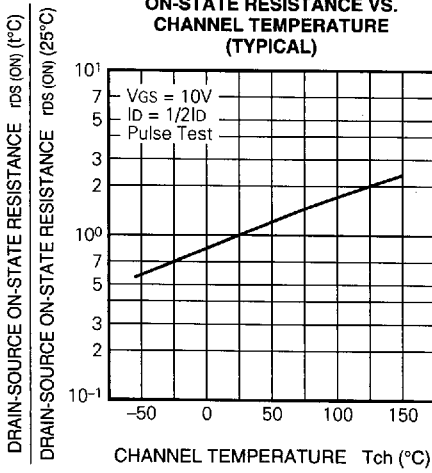
GATE-SOURCE VOLTAGE VS. GATE CHARGE (TYPICAL)



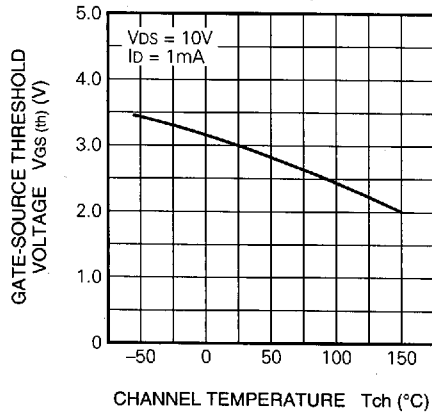
SOURCE-DRAIN DIODE FORWARD CHARACTERISTICS (TYPICAL)



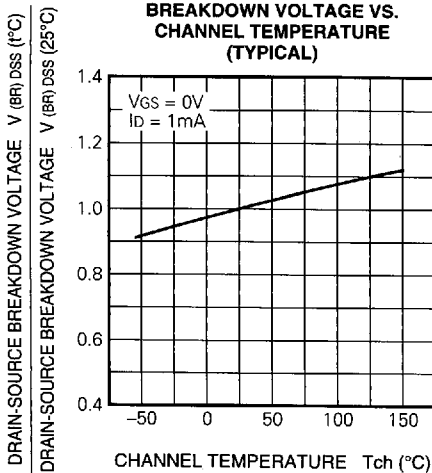
ON-STATE RESISTANCE VS. CHANNEL TEMPERATURE (TYPICAL)



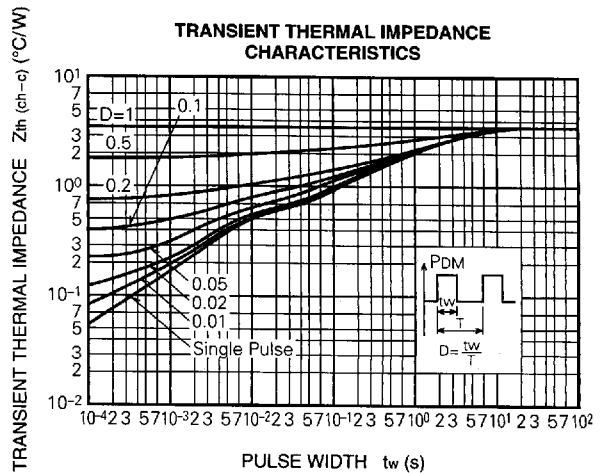
THRESHOLD VOLTAGE VS. CHANNEL TEMPERATURE (TYPICAL)



BREAKDOWN VOLTAGE VS. CHANNEL TEMPERATURE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS



# MITSUBISHI POWER MOSFET 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
<b>Dimensions</b> 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 h=16.0±0.5, i=5.5±0.5 ※Dimensions measured during processing				Unit: mm

### (1) TO-220 full molded outline

Applicable device FS\*\*KM-\*\*\*A

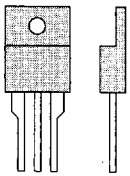
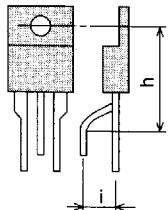
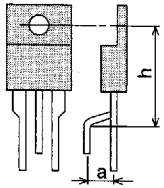
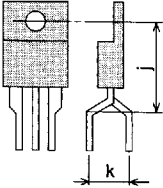
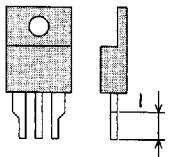
Standard outline	Standard forming outline			
	A5	A6	A8	AA
<b>Dimensions</b> a=3.0±0.5, b=14.7±0.5, c=5.0±0.5, d=4.5±0.5, e=20.1±0.5, g=15.5±0.5, h=16.0±0.5, i=5.5±0.5, j=19.0±0.5, k=7.75±0.5, l=4.0±0.5, m=15.1±0.5, n=16.5±0.5, o=3.8±0.35 ※Dimensions measured during processing				Unit: mm

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**MITSUBISHI POWER MOSFET**  
**LEAD FORMING OUTLINE AND TAPING**

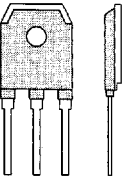
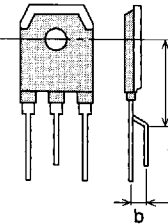
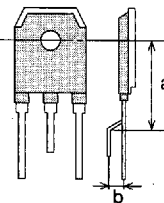
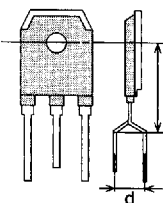
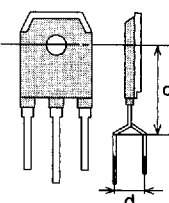
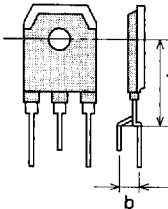
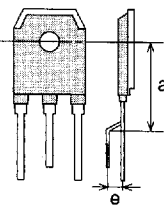
(2) TO-220 full molded outline

Applicable device	FS**KM-***A
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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, o=3.8±0.35 ※Dimensions measured during processing				Unit : mm

(3) TO-3P outline

Applicable device	FS**SM-***A · CT**SM-***
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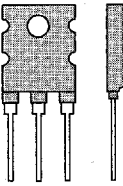
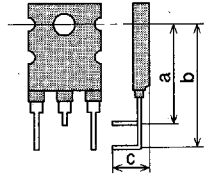
Standard outline	Standard forming outline				
	A7	A8	A9	A8	
					
					
Dimensions	a=23.5, b=5.45, c=23, d=9.5, e=4, f=21.5 ※Dimensions measured during processing				Unit : mm

MITSUBISHI POWER MOSFET

# LEAD FORMING OUTLINE AND TAPING

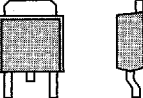
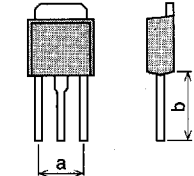
(4) TO-3PL outline

Applicable device	CT**AM-***
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Standard outline	Standard forming outline AC		
		Dimensions	$a=24\pm 0.5$ $b=31.5\pm 0.5$ $c=13.3\pm 0.6$  ※Dimensions measured during processing
			Unit : mm

(5) MP-3 outline

Applicable device	FS**AS-***A · CT20A**·8
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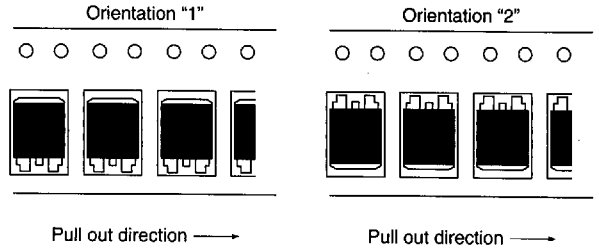
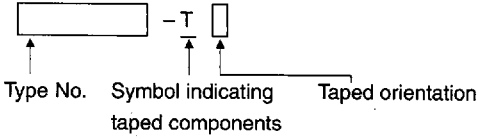
Standard outline	Standard forming outline A1		
		Dimensions	$a=4.6$ $b=14\text{min.}$  ※Dimensions measured during processing
			Unit : mm

# LEAD FORMING OUTLINE AND TAPING

## TAPING

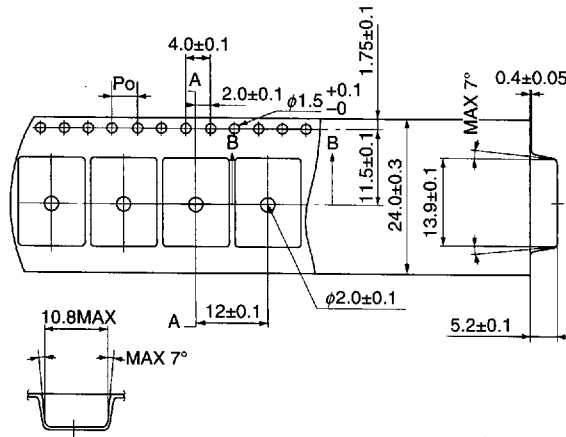
### (1) TO-220S

#### (a) Marking



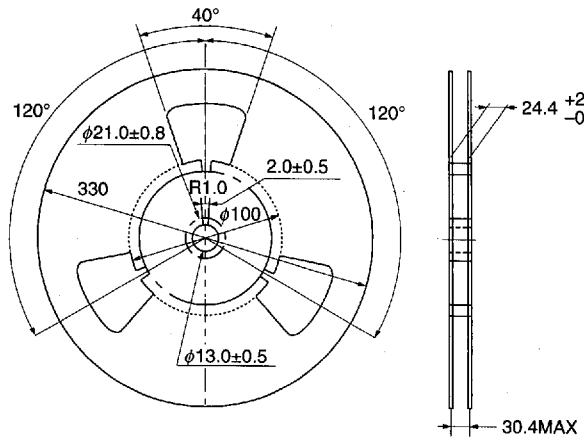
#### (b) Taping

- Tape shape and dimensions



Notice : The cumulative pitch error of Po (Free hole pitch) is  $\pm 0.2\text{mm}$  per 10 pitches.

- Reel shape and dimensions

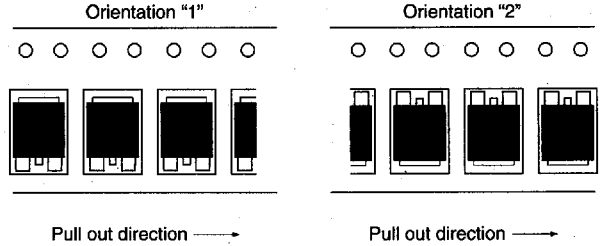
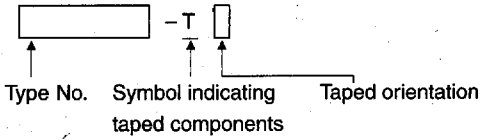




# LEAD FORMING OUTLINE AND TAPING

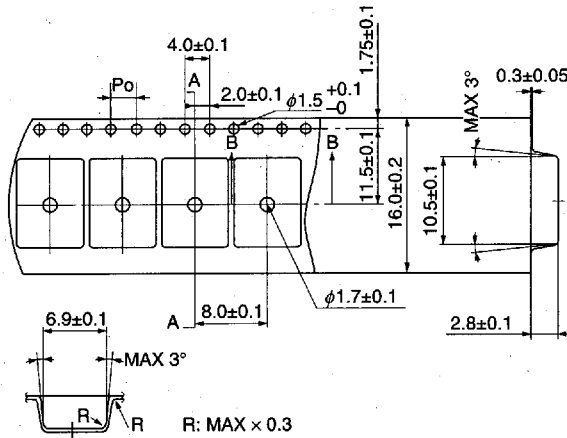
## (2) MP-3

### (a) Marking



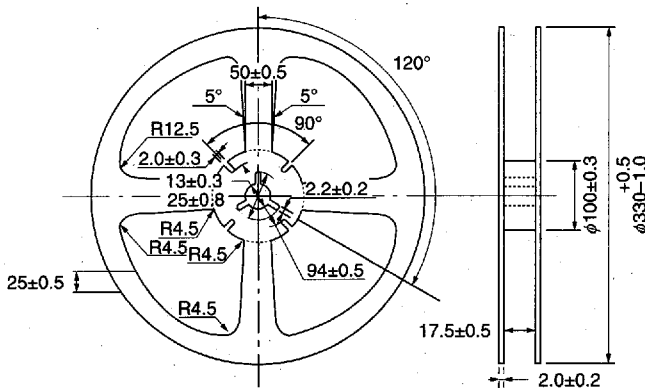
### (b) Taping

- Tape shape and dimensions



Notice : The cumulative pitch error of  $P_o$  (Free hole pitch) is  $\pm 0.2\text{mm}$  per 10 pitches.

- Reel shape and dimensions

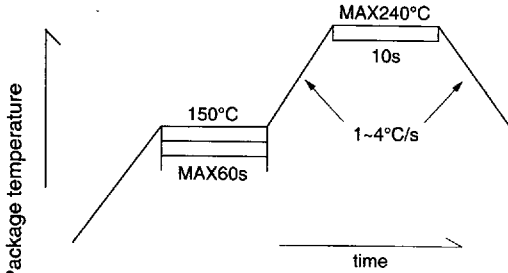


# LEAD FORMING OUTLINE AND TAPING

## Recommended conditions for surface mounting type

### Outline : TO-220S, MP-3

- (1) Board : Alumina, Insulated metal board
- (2) Solder plate thickness : 150 $\mu$ m-250 $\mu$ m
- (3) Temperature profile

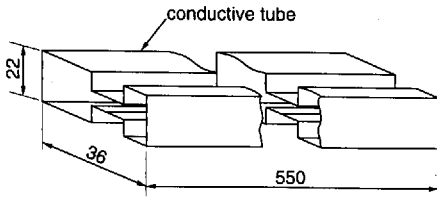


Infrared rays reflow temperature profile

## Individual package for lead forming outline

- (1) TO-220, TO-220FN, TO-220C, TO-220S

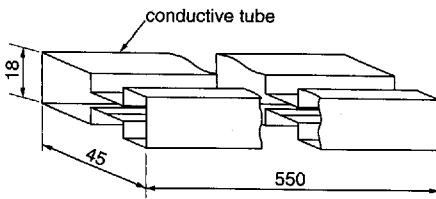
Dimensions in (Unit : mm)



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

- (2) TO-3P

Dimensions in (Unit : mm)



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