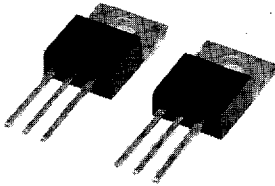


FS12UM-5

HIGH-SPEED SWITCHING USE

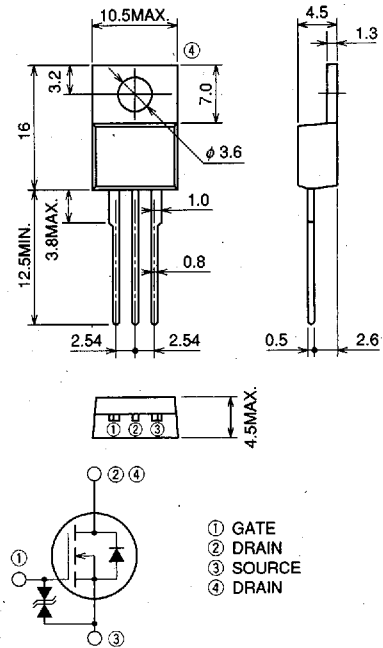
FS12UM-5



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

OUTLINE DRAWING

Dimensions in mm



TO-220

APPLICATION

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

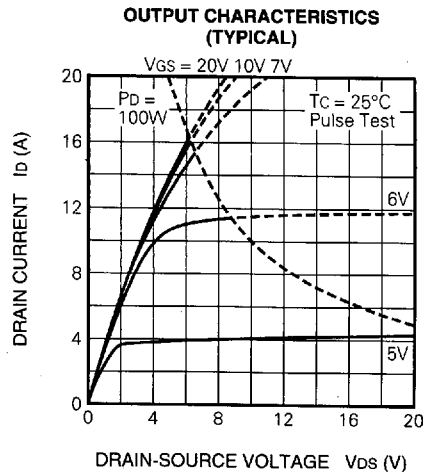
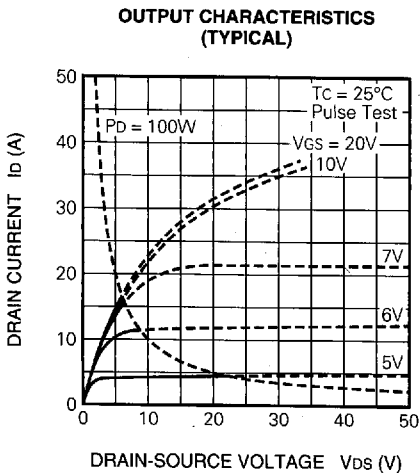
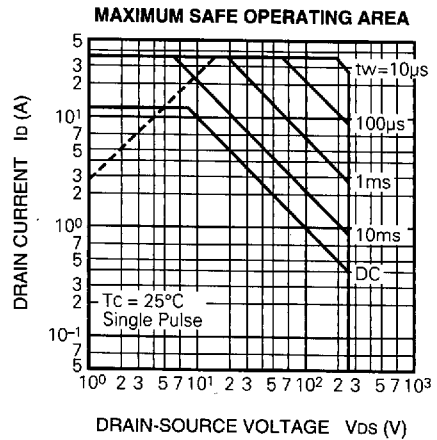
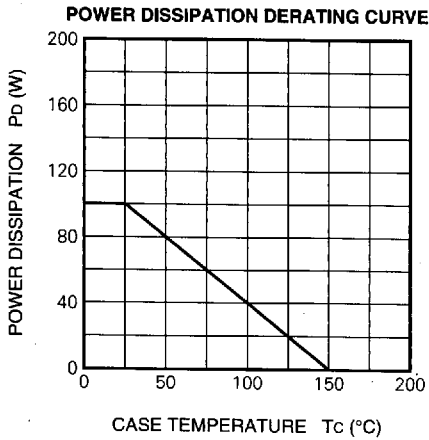
MAXIMUM RATINGS ($T_c = 25^\circ\text{C}$)

Symbol	Parameter	Conditions	Ratings	Unit
V_{DS}	Drain-source voltage	$V_{GS} = 0V$	250	V
V_{GS}	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		100	W
T_{ch}	Channel temperature		$-55 \sim +150$	$^\circ\text{C}$
T_{stg}	Storage temperature		$-55 \sim +150$	$^\circ\text{C}$
—	Weight	Typical value	2.0	g

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	V
Rth(ch-c)	Thermal resistance	Channel to case	—	—	1.25	°C/W

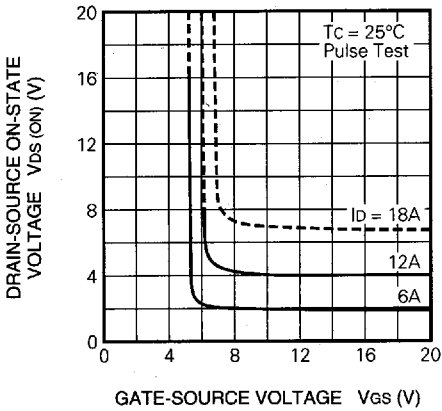
PERFORMANCE CURVES



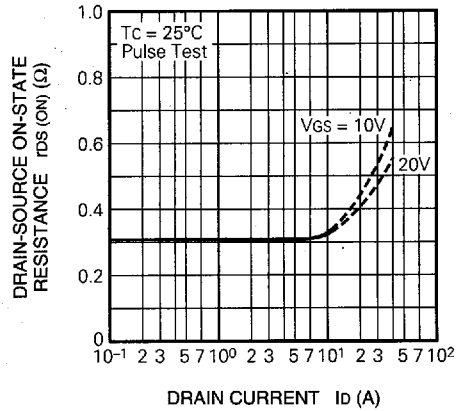
FS12UM-5

HIGH-SPEED SWITCHING USE

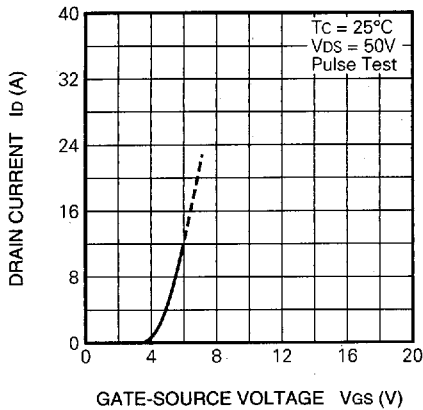
ON-STATE VOLTAGE VS.
GATE-SOURCE VOLTAGE
(TYPICAL)



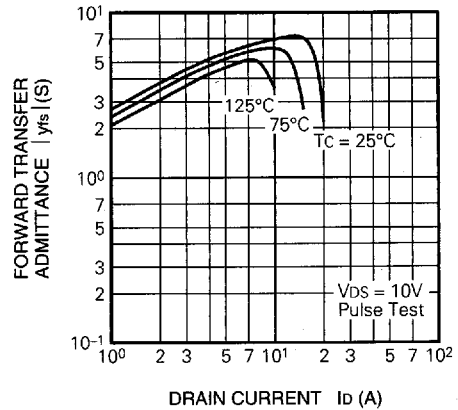
ON-STATE RESISTANCE VS.
DRAIN CURRENT
(TYPICAL)



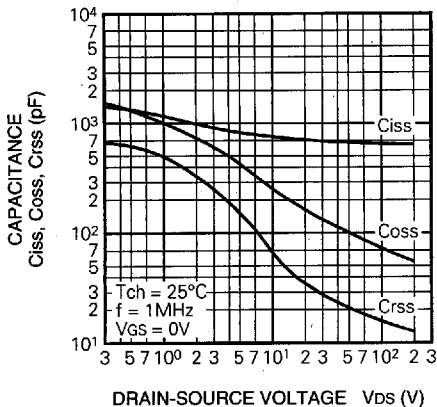
TRANSFER CHARACTERISTICS
(TYPICAL)



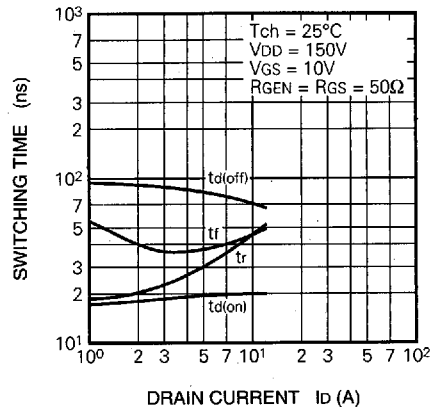
FORWARD TRANSFER ADMITTANCE
VS. DRAIN CURRENT
(TYPICAL)



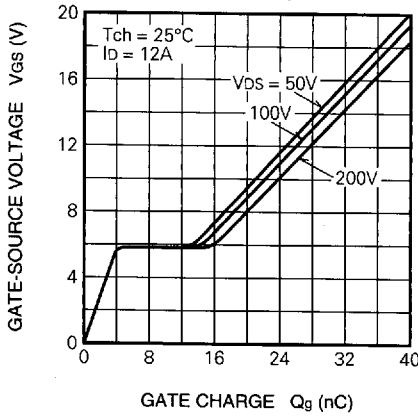
CAPACITANCE VS.
DRAIN-SOURCE VOLTAGE
(TYPICAL)



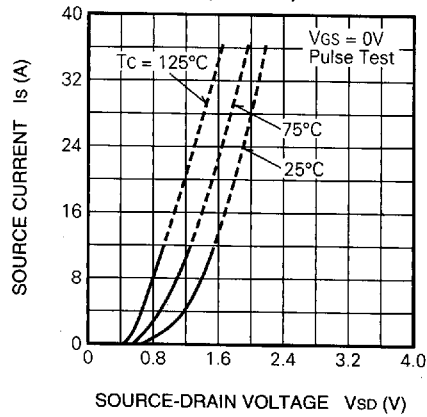
SWITCHING CHARACTERISTICS
(TYPICAL)



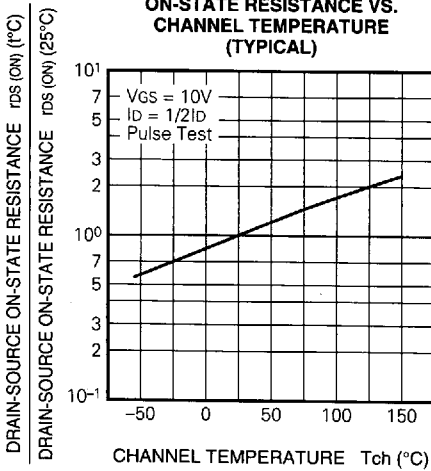
GATE-SOURCE VOLTAGE
VS. GATE CHARGE
(TYPICAL)



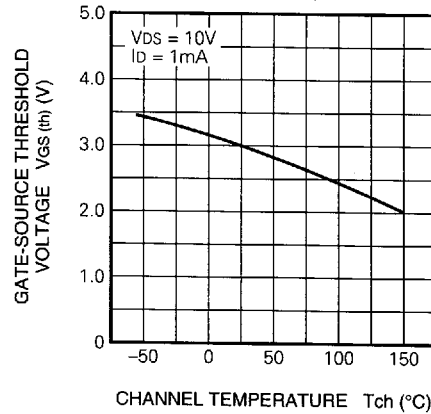
SOURCE-DRAIN DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



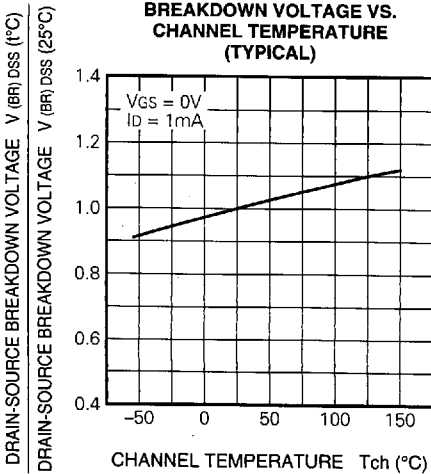
ON-STATE RESISTANCE VS.
CHANNEL TEMPERATURE
(TYPICAL)



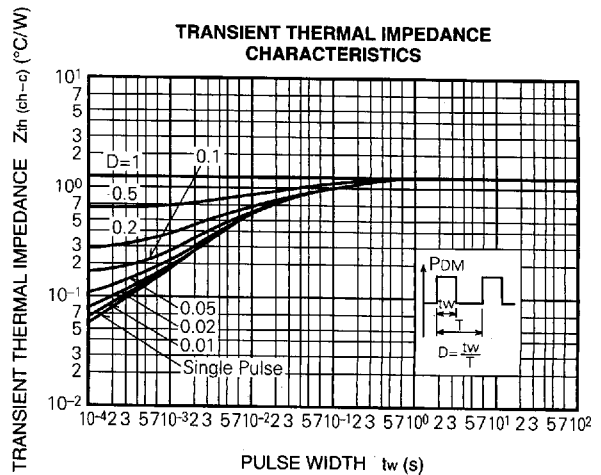
THRESHOLD VOLTAGE VS.
CHANNEL TEMPERATURE
(TYPICAL)



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
AJ	AN	AS	AT	
Dimensions	$a=3.0\pm0.5$, $b=14.7\pm0.5$, $c=5.0\pm0.5$, $d=4.5\pm0.5$, $e=20.1\pm0.5$, $f=3.0\pm0.5$, $g=15.5\pm0.5$ $h=16.0\pm0.5$, $i=5.5\pm0.5$ ※Dimensions measured during processing			
	Unit : mm			

(1) TO-220 full molded outline

Applicable device FS**KM-***A

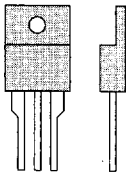
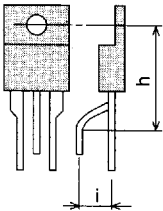
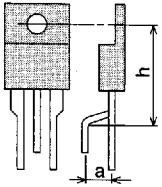
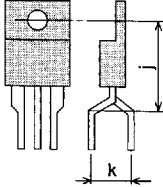
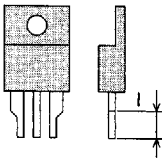
Standard outline	Standard forming outline			
	A5	A6	A8	AA
AG	AH	AN	AS	
Dimensions	$a=3.0\pm0.5$, $b=14.7\pm0.5$, $c=5.0\pm0.5$, $d=4.5\pm0.5$, $e=20.1\pm0.5$, $g=15.5\pm0.5$, $h=16.0\pm0.5$, $i=5.5\pm0.5$, $j=19.0\pm0.5$, $k=7.75\pm0.5$, $l=4.0\pm0.5$, $m=15.1\pm0.5$, $n=16.5\pm0.5$, $o=3.8\pm0.35$ ※Dimensions measured during processing			
	Unit : mm			

6249829 0019591 140

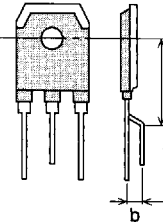
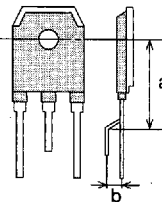
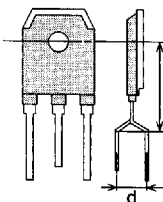
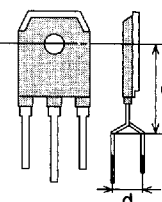
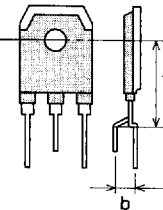
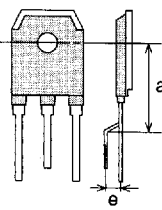
MITSUBISHI POWER MOSFET

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, o=3.8±0.35 ※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 ※Dimensions measured during processing			
		Unit : mm			

MITSUBISHI POWER MOSFET

LEAD FORMING OUTLINE AND TAPING

(4) TO-3PL outline

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

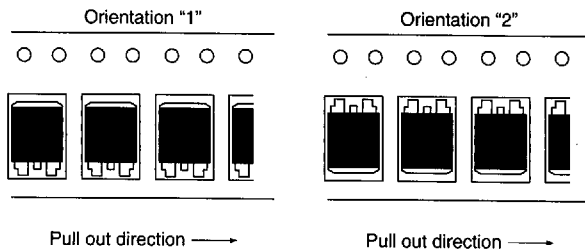
(5) MP-3 outline

		Applicable device		FS**AS-**A・CT20A**-8
Standard outline	Standard forming outline	Dimensions	Unit : mm	
			a=4.6 b=14min.	
			※Dimensions measured during processing	

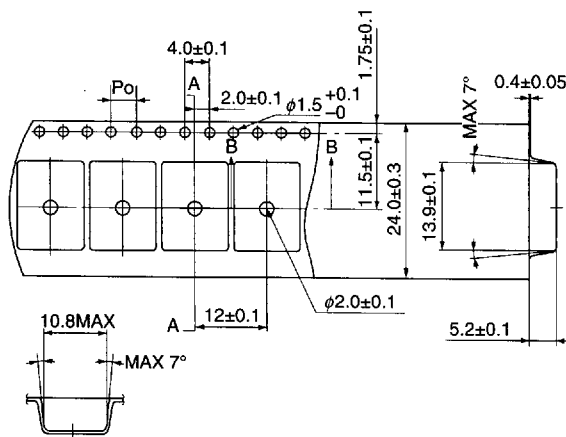
(1) TO-220S

Diagram illustrating the components of a Taped Orientation Symbol:

- Type No.
- Symbol indicating taped components
- Taped orientation

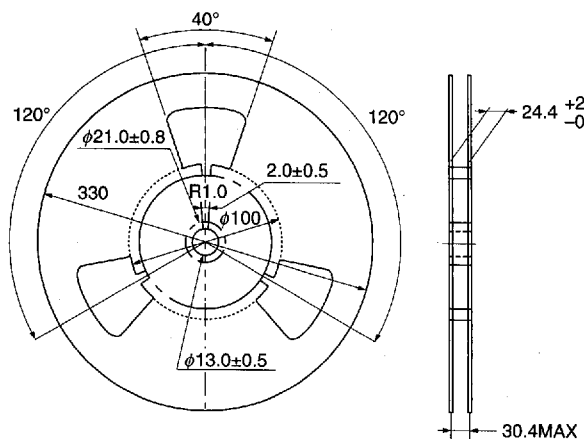


- Tape shape and dimensions



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

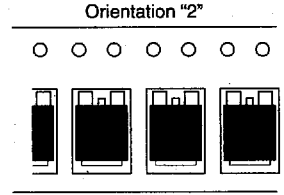
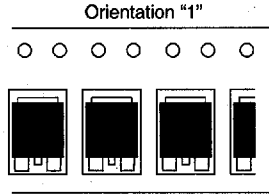
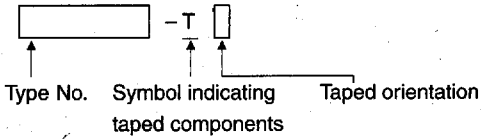
- Reel shape and dimensions



LEAD FORMING OUTLINE AND TAPING

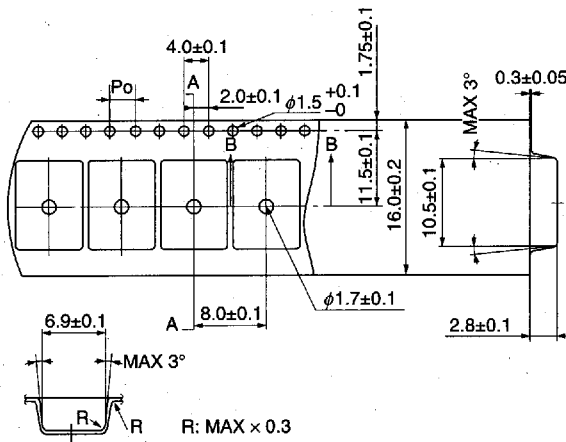
(2) MP-3

(a) Marking



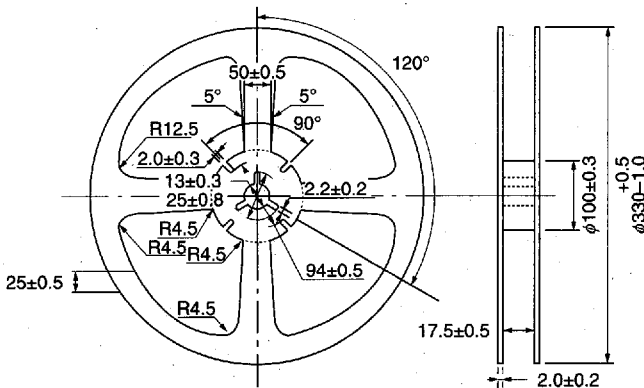
(b) Taping

• Tape shape and dimensions



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

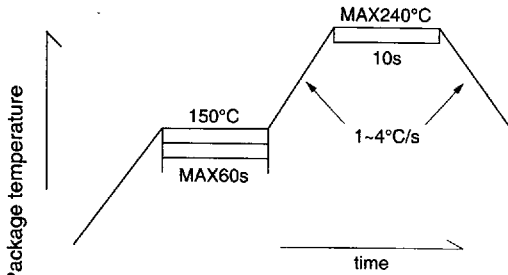
• Reel shape and dimensions



Recommended conditions for surface mounting type

Outline : TO-220S, MP-3

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

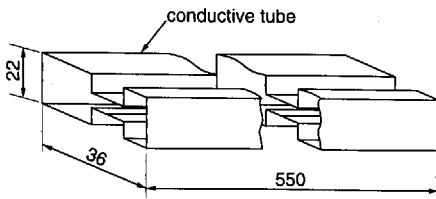


Infrared rays reflow temperature profile

Individual package for lead forming outline

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

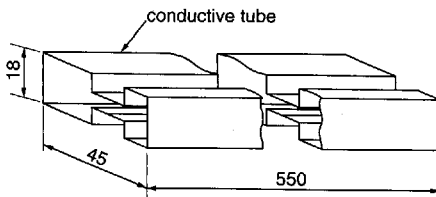
Dimensions in (Unit : mm)



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

- (2) TO-3P

Dimensions in (Unit : mm)



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