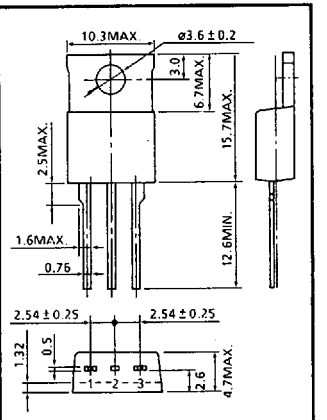
2SK1600

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS.
DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS.

INDUSTRIAL APPLICATIONS

Unit in mm



JEDEC	TO-220AB
EIAJ	SC-46
TOSHIBA	2-10P1B

Weight : 2.0g

- Low Drain-Source ON Resistance : $R_{DS\,(ON)} = 4.3\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 1.7S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100\mu A$ (Max.) @$V_{DS} = 640V$
- Enhancement-Mode : $V_{th} = 1.5 \sim 3.5V$ @$V_{DS} = 10V$, $I_D = 1mA$

MAXIMUM RATINGS (Ta = 25°C)

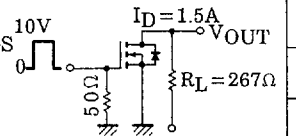
CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	800	V
Drain-Gate Voltage ($R_{GS} = 20k\Omega$)		V_{DGR}	800	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	DC	I_D	3	A
	Pulse	I_{DP}	9	
Drain Power Dissipation (Tc = 25°C)		P_D	75	W
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th\,(ch\text{-}c)}$	1.67	°C/W
Thermal Resistance, Channel to Ambient	$R_{th\,(ch\text{-}a)}$	83.3	°C/W

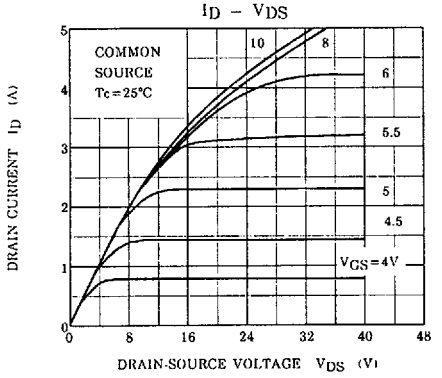
THIS TRANSISTOR IS AN ELECTROSTATIC SENSITIVE DEVICE. PLESE HANDLE WITH CAUTION.

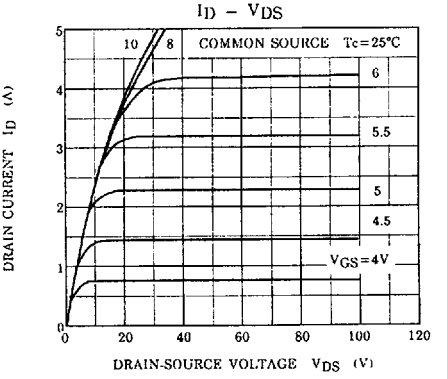
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

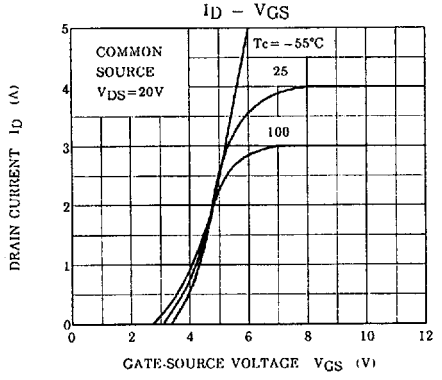
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 25V$, $V_{DS} = 0V$	—	—	±100	nA
Drain Cut-off Current		I_{DSS}	$V_{DS} = 640V$, $V_{GS} = 0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10mA$, $V_{GS} = 0V$	800	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10V$, $I_D = 1mA$	1.5	—	3.5	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$I_D = 1.5A$, $V_{GS} = 10V$	—	4.3	5.0	Ω
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS} = 20V$, $I_D = 1.5A$	1.0	1.7	—	S
Input Capacitance		C_{iss}	$V_{DS} = 25V$, $V_{GS} = 0V$, $f = 1MHz$	—	360	700	pF
Reverse Transfer Capacitance		C_{rss}		—	30	50	
Output Capacitance		C_{oss}		—	60	90	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, $t_f < 5ns$, $V_{DD} \fallingdotseq 400V$ Duty ≦ 1%, $t_w = 10\mu s$	—	25	50	ns
	Turn-on Time	t_{on}		—	40	60	
	Fall Time	t_f		—	40	80	
	Turn-off Time	t_{off}		—	150	300	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \fallingdotseq 400V$, $V_{GS} = 10V$, $I_D = 3A$	—	26	50	nC
Gate-Source Charge		Q_{gs}		—	16	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	10	—	

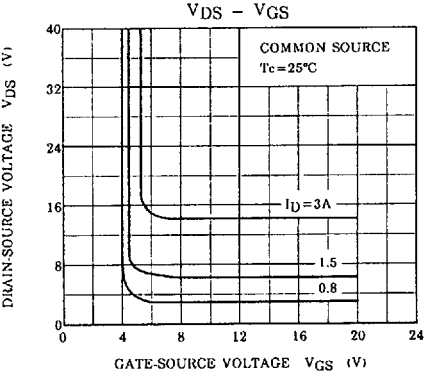
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

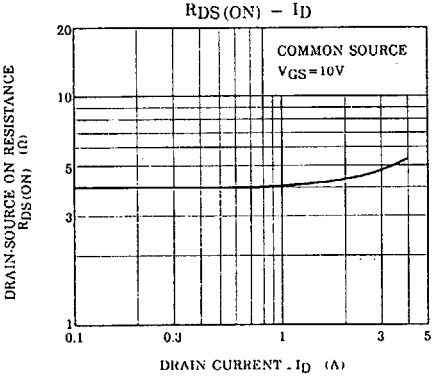
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	3	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	9	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 3A$, $V_{GS} = 0V$	—	—	−2.0	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 3A$, $V_{GS} = 0V$ $dI_{DR}/dt = 100A/\mu s$	—	600	—	ns
Reverse Recovery Charge	Q_{rr}		—	12	—	μC

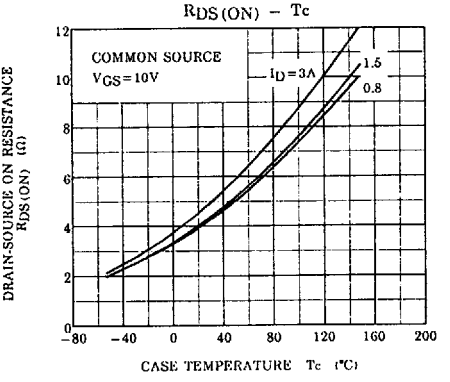

I_D – V_{DS}
COMMON SOURCE
Tc=25°C
10
8
6
5.5
5
4.5
V_{GS}=4V
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)

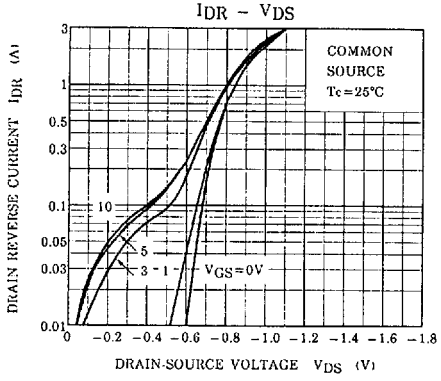

I_D – V_{DS}
10
8
COMMON SOURCE Tc=25°C
6
5.5
5
4.5
V_{GS}=4V
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)

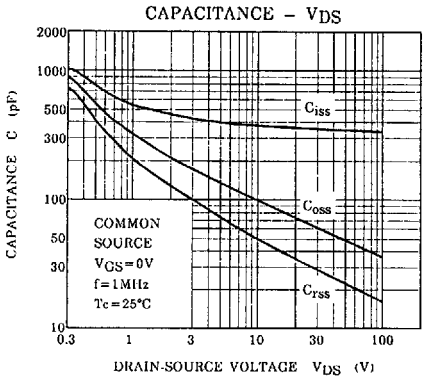

I_D – V_{GS}
COMMON SOURCE
V_{DS}=20V
Tc=–55°C
25
100
DRAIN CURRENT I_D (A)
GATE-SOURCE VOLTAGE V_{GS} (V)

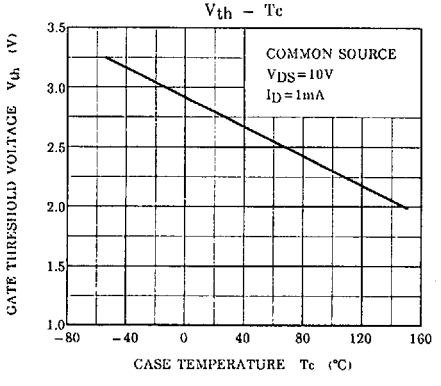

V_{DS} – V_{GS}
COMMON SOURCE
Tc=25°C
I_D=3A
1.5
0.8
DRAIN-SOURCE VOLTAGE V_{DS} (V)
GATE-SOURCE VOLTAGE V_{GS} (V)

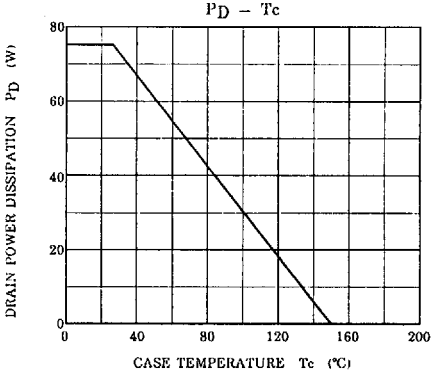

$R_{DS(ON)}$ – I_D
COMMON SOURCE
V_{GS}=10V
DRAIN-SOURCE ON RESISTANCE $R_{DS(ON)}$ (Ω)
DRAIN CURRENT - I_D (A)

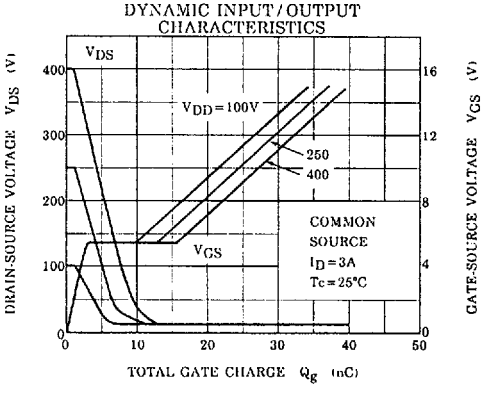

$R_{DS(ON)}$ – Tc
COMMON SOURCE
V_{GS}=10V
I_D=3A
1.5
0.8
DRAIN-SOURCE ON RESISTANCE $R_{DS(ON)}$ (Ω)
CASE TEMPERATURE Tc (°C)

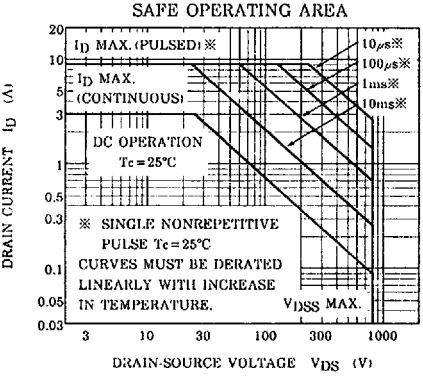

I_{DR} – V_{DS}
COMMON SOURCE
Tc=25°C
10
5
3
1
V_{GS}=0V
DRAIN REVERSE CURRENT I_{DR} (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)

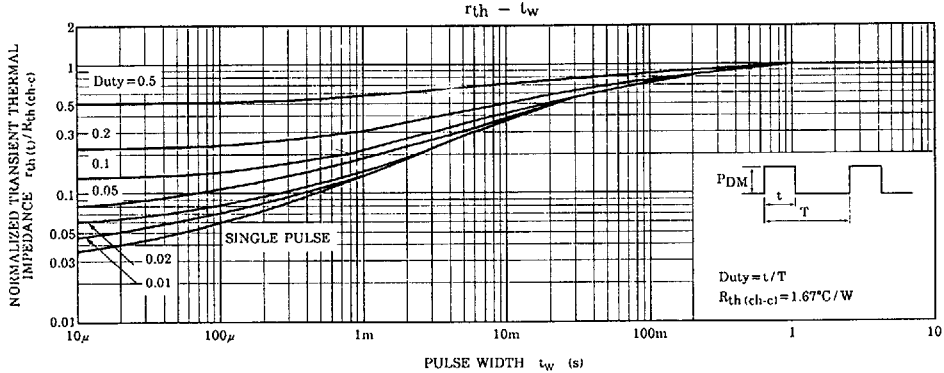

CAPACITANCE – V_{DS}
C_{iss}
C_{oss}
C_{rss}
COMMON SOURCE
V_{GS}=0V
f=1MHz
Tc=25°C
CAPACITANCE C (pF)
DRAIN-SOURCE VOLTAGE V_{DS} (V)


V_{th} – Tc
COMMON SOURCE
V_{DS}=10V
I_D=1mA
GATE THRESHOLD VOLTAGE V_{th} (V)
CASE TEMPERATURE Tc (°C)

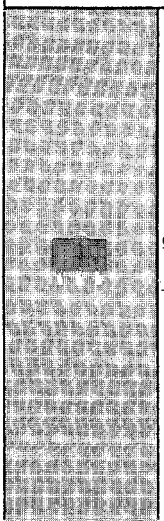

P_D – Tc
DRAIN POWER DISSIPATION P_D (W)
CASE TEMPERATURE Tc (°C)


DYNAMIC INPUT/OUTPUT CHARACTERISTICS
V_{DS}
V_{DD}=100V
250
400
V_{GS}
COMMON SOURCE
I_D=3A
Tc=25°C
DRAIN-SOURCE VOLTAGE V_{DS} (V)
GATE-SOURCE VOLTAGE V_{GS} (V)
TOTAL GATE CHARGE Q_g (nC)

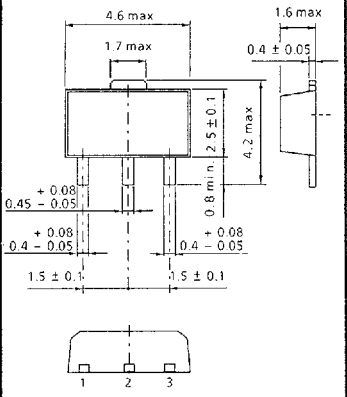

SAFE OPERATING AREA
I_D MAX. (PULSED)※
I_D MAX. (CONTINUOUS)
DC OPERATION
Tc=25°C
10μs※
100μs※
1ms※
10ms※
※ SINGLE NONREPETITIVE PULSE Tc=25°C
CURVES MUST BE DERATED LINEARLY WITH INCREASE IN TEMPERATURE.
V_{DSS} MAX.
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)


rth – tw
NORMALIZED TRANSIENT THERMAL IMPEDANCE rth(t)/Rth(ch-c)
2
1
0.5
0.3
0.2
0.1
0.05
0.03
0.02
0.01
Duty=0.5
0.2
0.1
0.05
SINGLE PULSE
0.02
0.01
PDM
t
T
Duty=t/T
Rth(ch-c)=1.67°C/W
10μ
100μ
1m
10m
100m
1
10
PULSE WIDTH tw (s)

POWER-MINI (SOT-89)

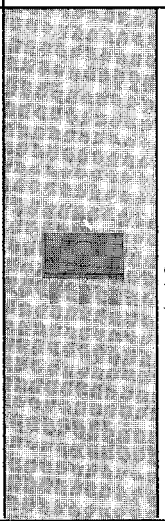


Unit: mm

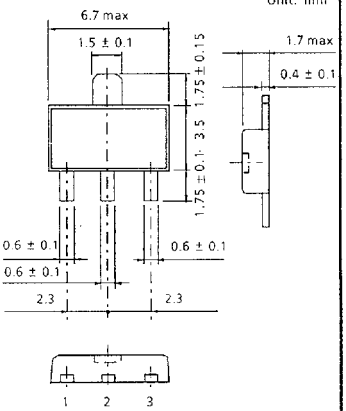


1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

SP (SOT-223)

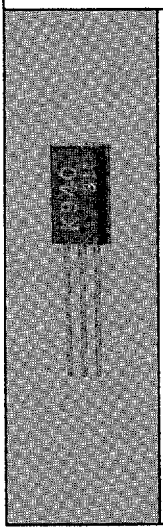


Unit: mm

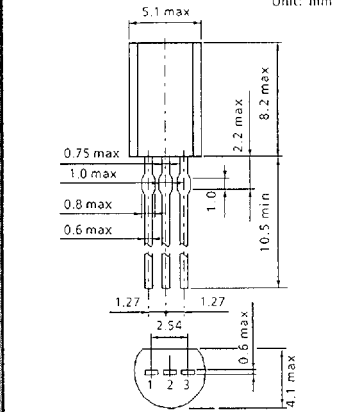


1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

TO92-MOD

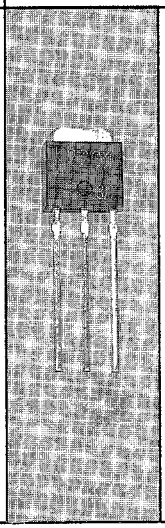


Unit: mm

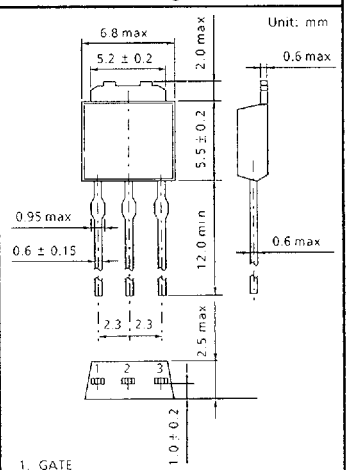


1. SOURCE
2. DRAIN
3. GATE

POWER-MOLD (Straight)

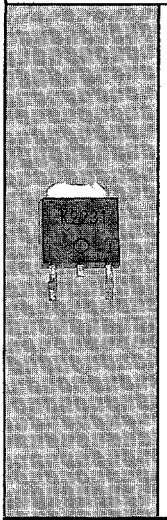


Unit: mm

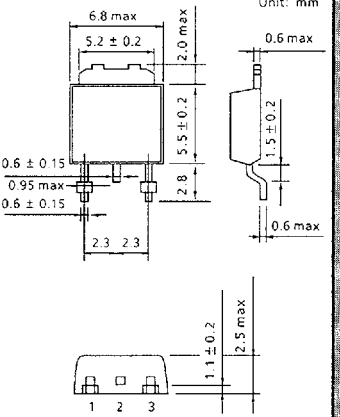


1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

POWER-MOLD (Lead Formed)

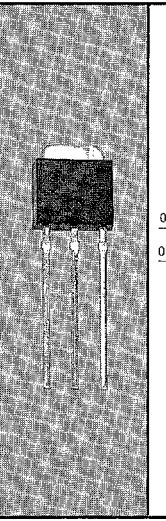


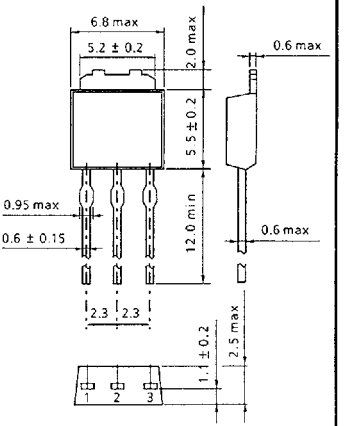
Unit: mm



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

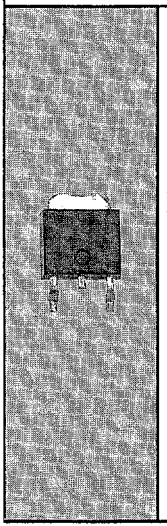
DP (Straight)

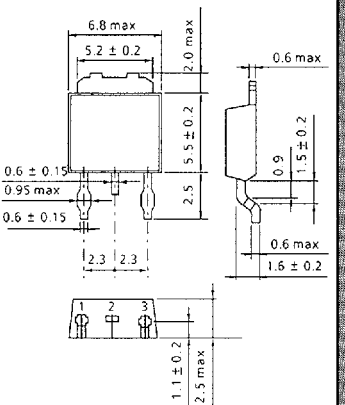




1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

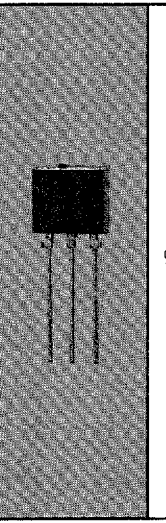
DP (Lead Forming)



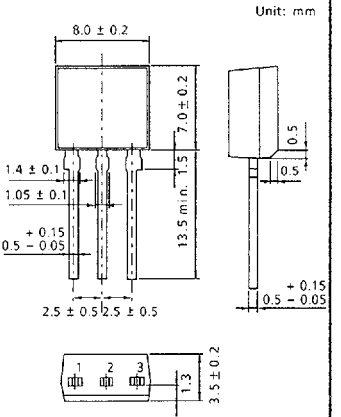


1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

TPS

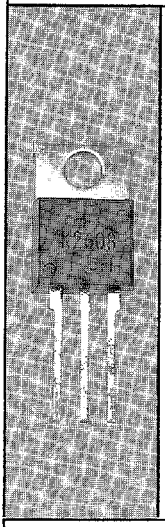


Unit: mm

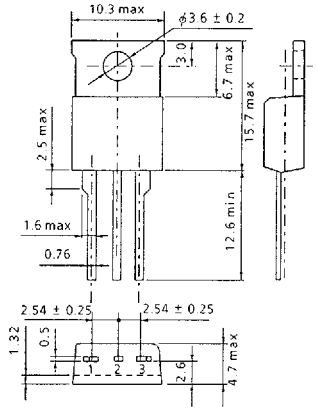


1. SOURCE
2. DRAIN
3. GATE

TO-220AB

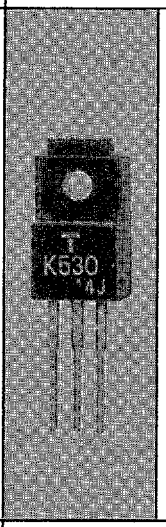


Unit: mm

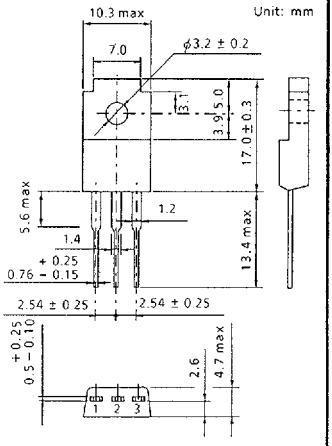


1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

TO-220 (IS)

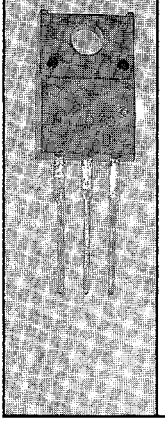


Unit: mm

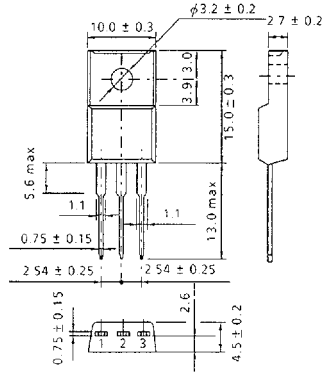


1. GATE
2. DRAIN
3. SOURCE

TO-220 (NIS)

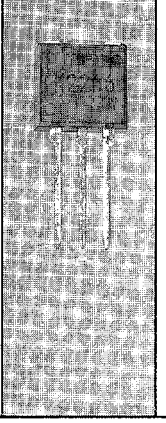


Unit: mm

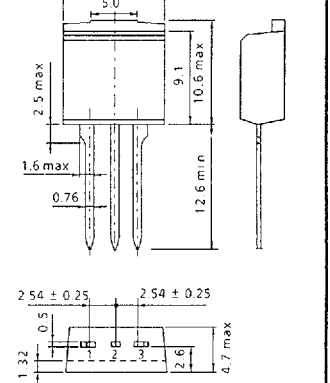


1. GATE
2. DRAIN
3. SOURCE

TO-220FL

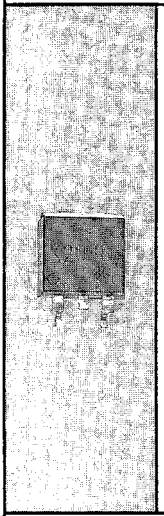


Unit: mm

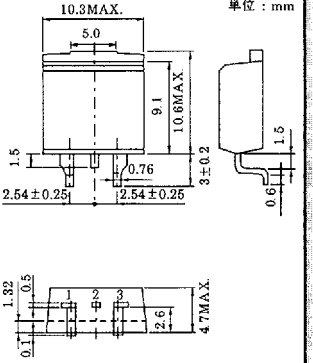


1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

TO-220SM

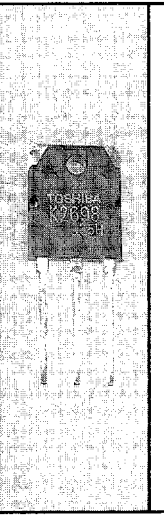


単位：mm

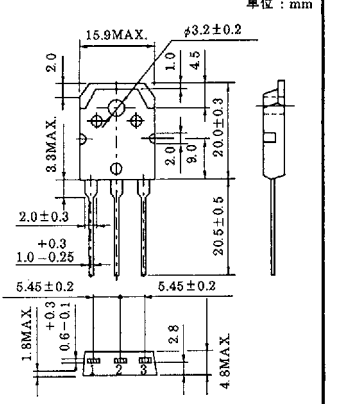


1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

TO-3P (N)

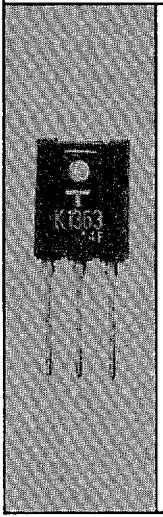


単位：mm

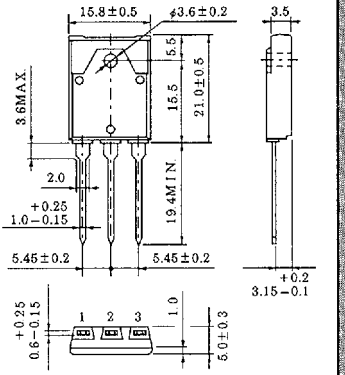


1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

TO-3P (N) IS

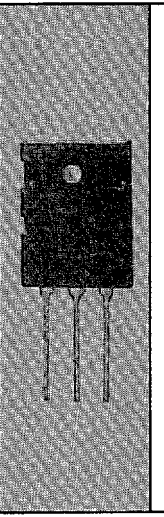


単位：mm

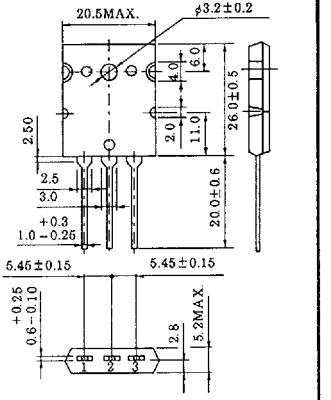


1. GATE
2. DRAIN
3. SOURCE

TO-3P (L)



単位：mm



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE