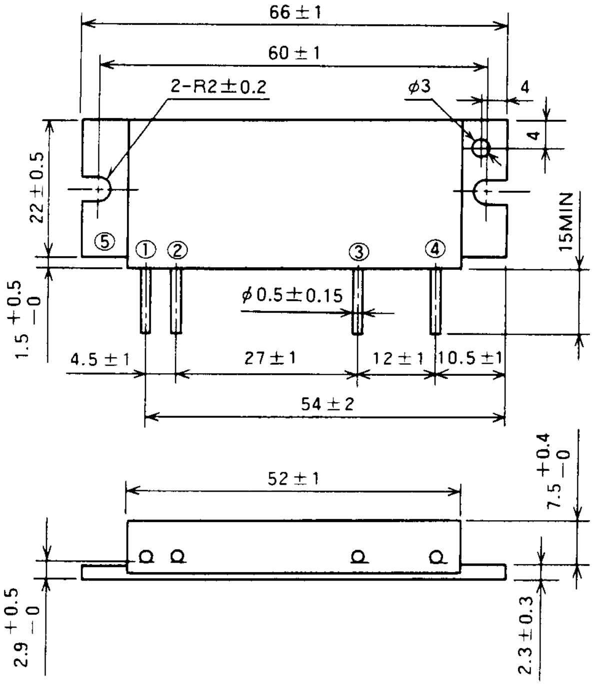
M67730L

175-200MHz, 12.5V, 30W, FM MOBILE RADIO

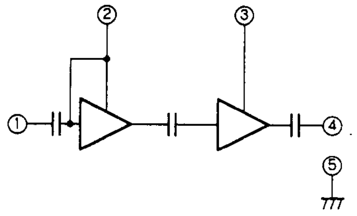
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		7	A
Pin(max)	Input power	ZG = ZL = 50 Ω, Vcc1 ≦ 12.5V	0.6	W
Po(max)	Output power	ZG = ZL = 50 Ω	40	W
Tc(OP)	Operation case temperature		− 30 to 110	℃
Tstg	Storage temperature		− 40 to 110	℃

Note. Above parameters are guaranteed independently.

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	Pin = 0.3W Vcc = 12.5V ZG = ZL = 50 Ω	175	200	MHz
Po	Output power		30		W
η_T	Total efficiency		43		%
2fo	2nd. harmonic			− 30	dBc
3fo	3rd. harmonic			− 35	dBc
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 30W (Pin : controlled) Load VSWR≧20:1 (All phase), 2sec. ZG = 50 Ω	No degradation or destroy		−

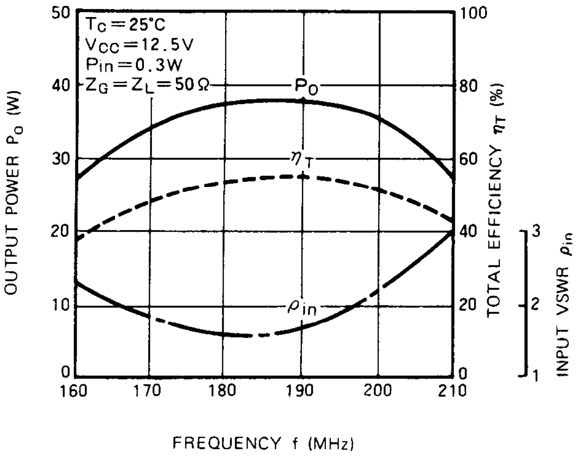
Note. Above parameters, ratings, limits and conditions are subject to change.

NOV. '97

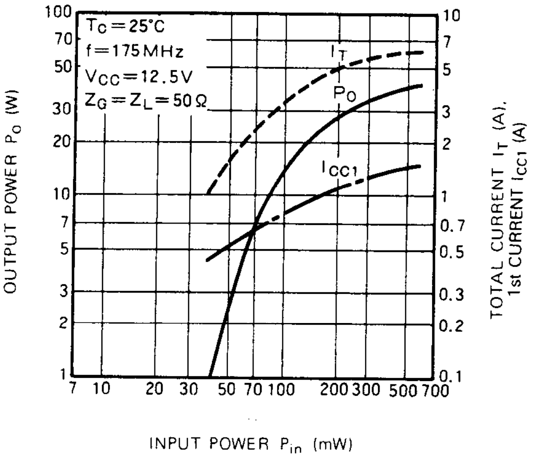
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

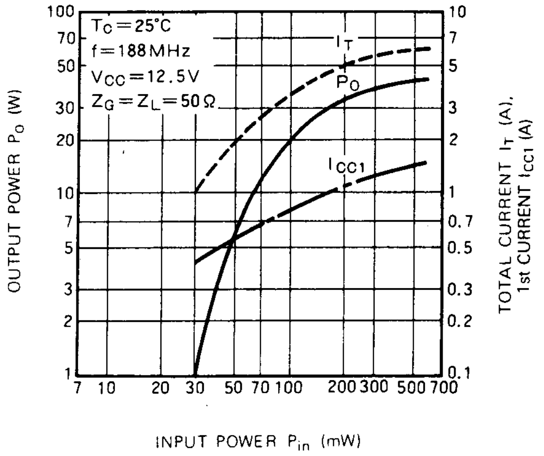
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



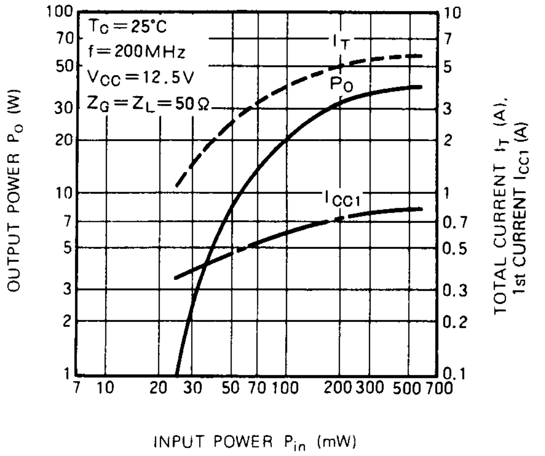
OUTPUT POWER, TOTAL CURRENT, 1st CURRENT VS. INPUT POWER CHARACTERISTICS



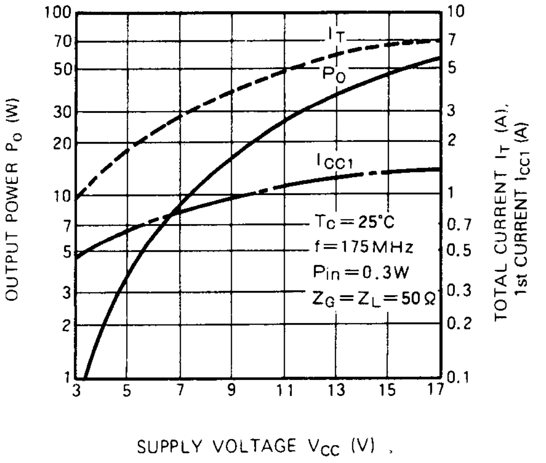
OUTPUT POWER, TOTAL CURRENT, 1st CURRENT VS. INPUT POWER CHARACTERISTICS



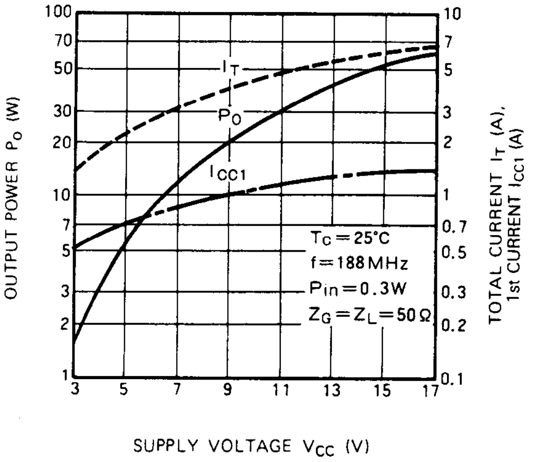
OUTPUT POWER, TOTAL CURRENT, 1st CURRENT VS. INPUT POWER CHARACTERISTICS



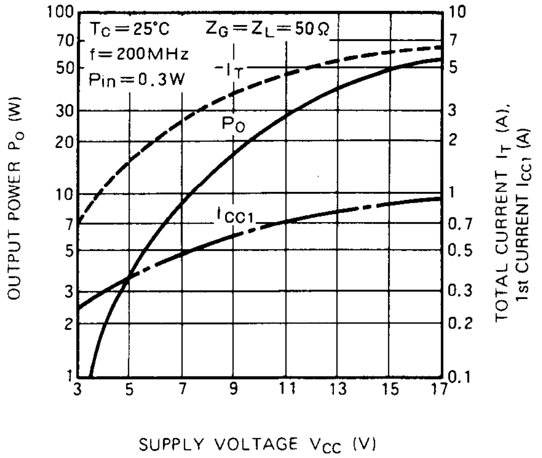
OUTPUT POWER, TOTAL CURRENT, 1st CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



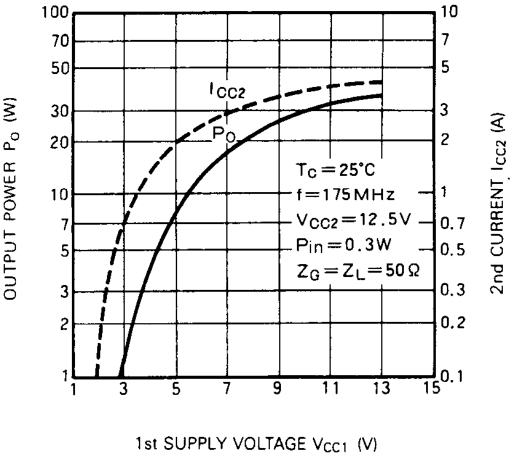
OUTPUT POWER, TOTAL CURRENT, 1st CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



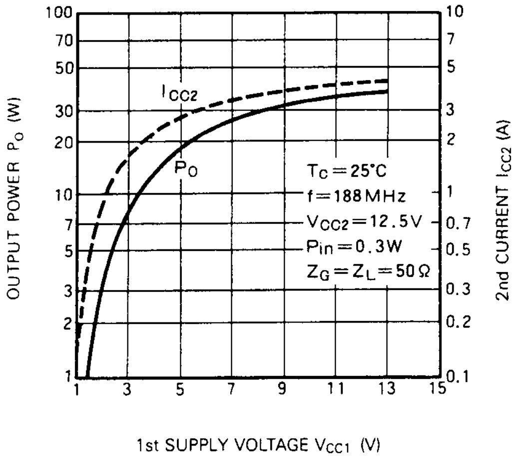
OUTPUT POWER, TOTAL CURRENT, 1st CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



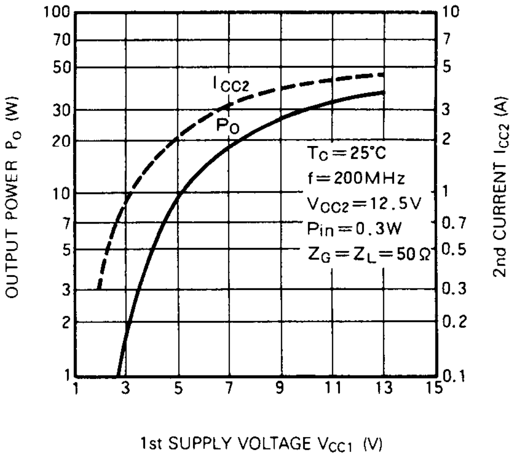
OUTPUT POWER, 2nd CURRENT VS. 1st SUPPLY VOLTAGE CHARACTERISTICS



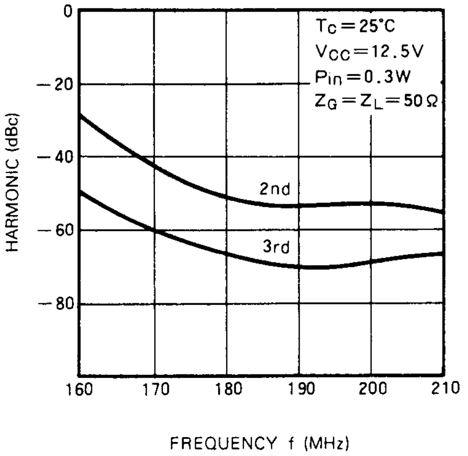
OUTPUT POWER, 2nd CURRENT VS. 1st SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd CURRENT VS. 1st SUPPLY VOLTAGE CHARACTERISTICS



2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 8^{\circ}C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 2^{\circ}C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

Conditions for standard operation.

$P_o = 30W$, $V_{CC} = 12.5V$, $P_{in} = 0.3W$, $\eta_T = 43\%$ (minimum rating), $P_{o1}^{(Note\ 1)} = 5W$, $I_T = 5.6A$ ($I_{T1}^{(2)} = 0.9A$, $I_{T2}^{(3)} = 4.7A$)

Note 1: Output power of the first stage transitor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_C^{(4)}$$
$$= (12.5 \times 0.9 - 5 + 0.3) \times 8 + T_C$$
$$= 52 + T_C\ (^{\circ}C)$$

Note 4: Package temperature of device

Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{o1}) \times R_{th(j-c)2} + T_C$$
$$= (12.5 \times 4.7 - 30 + 5) \times 2 + T_C$$
$$= 68 + T_C\ (^{\circ}C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60^{\circ}C$) and at the output power of 28W below 90°C.

The thermal resistance $R_{th(j-a)}^{(5)}$ of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(30/0.43) - 30 + 0.3}$$
$$= 0.75\ (^{\circ}C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

$T_{j1} = 142^{\circ}C$, $T_{j2} = 158^{\circ}C$ at $T_a = 60^{\circ}C$, $T_C = 90^{\circ}C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 112^{\circ}C$, $T_{j2} = 128^{\circ}C$

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.