# TOSHIBA

*MICROWAVE SEMICONDUCTOR*

TECHNICAL DATA

MICROWAVE POWER GaAs FET

## TIM7785-30SL

## FEATURES:

- LOW INTERMODULATION DISTORTION
  IM3 = -45 dBc at Po = 34.5 dBm,
  Single Carrier Level
- HIGH POWER
  $P_{1dB}$ = 45 dBm at 7.7 GHz to 8.5 GHz
- HIGH EFFICIENCY
  $\eta$ add = 34 % at 7.7 GHz to 8.5 GHz
- HIGH GAIN
  $G_{1dB}$ = 6.0dB at 7.7 GHz to 8.5 GHz
- BROAD BAND TNTERNALLY MATCHED
- HERMETICALLY SEALED PACKAGE

## RF PERFORMANCE SPECIFICATIONS (Ta = 25℃)

| CHARACTERISITCS | SYMBOL | CONDITION | UNIT | MIN. | TYP. | MAX. |
|---|---|---|---|---|---|---|
| Output Power at 1 dB Compression Point | $P_{1dB}$ | $V_{DS}$ = 10V<br>f = 7.7~8.5GHz | dBm | 44.0 | 45.0 | - |
| Power Gain at 1 dB Compression Point | $G_{1dB}$ | | dB | 5.0 | 6.0 | - |
| Drain Current | $I_{DS}$ | | A | - | 7.0 | 8.0 |
| Power Added Efficiency | $\eta$ add | | % | - | 34 | - |
| 3rd Order Intermodulation Distortion | $IM_3$ | Note 1 | dBc | -42 | -45 | - |
| Channel Temperature Rise | $\triangle T_{ch}$ | $V_{DS} \times I_{DS} \times R_{th(c-c)}$ | ℃ | - | - | 100 |

## ELECTRICAL CHARACTERISTICS (Ta = 25℃)

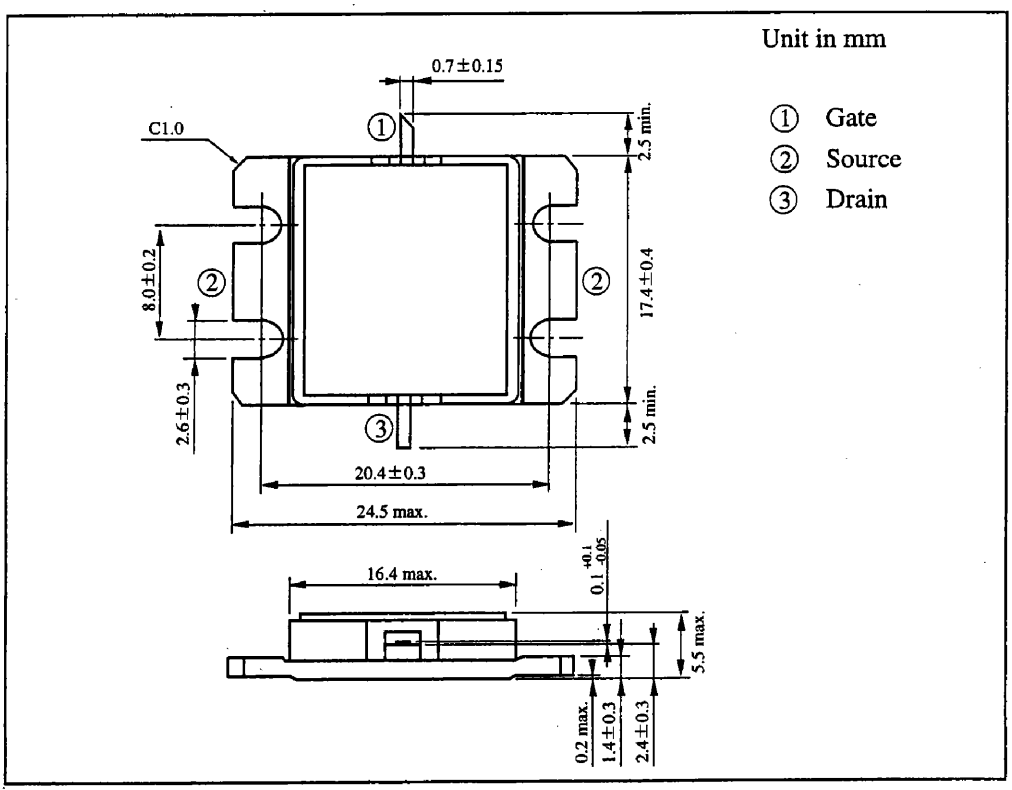
| CHARACTERISITCS | SYMBOL | CONDITION | UNIT | MIN. | TYP. | MAX. |
|---|---|---|---|---|---|---|
| Trans-conductance | gm | $V_{DS}$ = 3V<br>$I_{DS}$ = 10A | mS | - | 6300 | - |
| Pinch-off Voltage | VGSoff | $V_{DS}$ = 3V<br>$I_{DS}$ = 100mA | V | -1.0 | -2.5 | -4.0 |
| Saturated Drain Current | $I_{DSS}$ | $V_{DS}$ = 3V<br>$V_{GS}$ = 0V | A | - | 18 | 22 |
| Gate-Source Breakdown Voltage | $V_{GSO}$ | $I_{GS}$ = -350$\mu$A | V | -5 | - | - |
| Thermal Resistance | $R_{th(c-c)}$ | Channel to Case | ℃/W | - | 1.0 | 1.3 |

Note 1: 2 tone Test Pout = 34.5dBm Single Carrier Level.
Recommended Gate Resistance(Rg) : Rg = Rg1(10 Ω) + Rg2(18 Ω) = 28 Ω (MAX.)

## ABSOLUTE MAXIMUM RATINGS (Ta = 25℃)

| CHARACTERISTIC | SYMBOL | UNIT | RATING |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | V | 15 |
| Gate-Source Voltage | $V_{GS}$ | V | -5 |
| Drain Current | $I_{DS}$ | A | 22 |
| Total Power Dissipation (Tc=25℃) | $P_T$ | W | 115 |
| Channel Temperature | $T_{ch}$ | ℃ | 175 |
| Storage Temperature | $T_{stg}$ | ℃ | -65~175 |

## PACKAGE OUTLINE (2-16G1B)

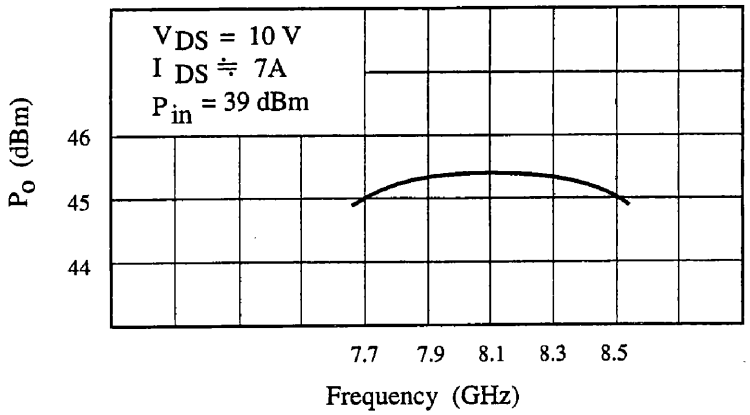



## HANDLING PRECAUTIONS FOR PACKAGED TYPE

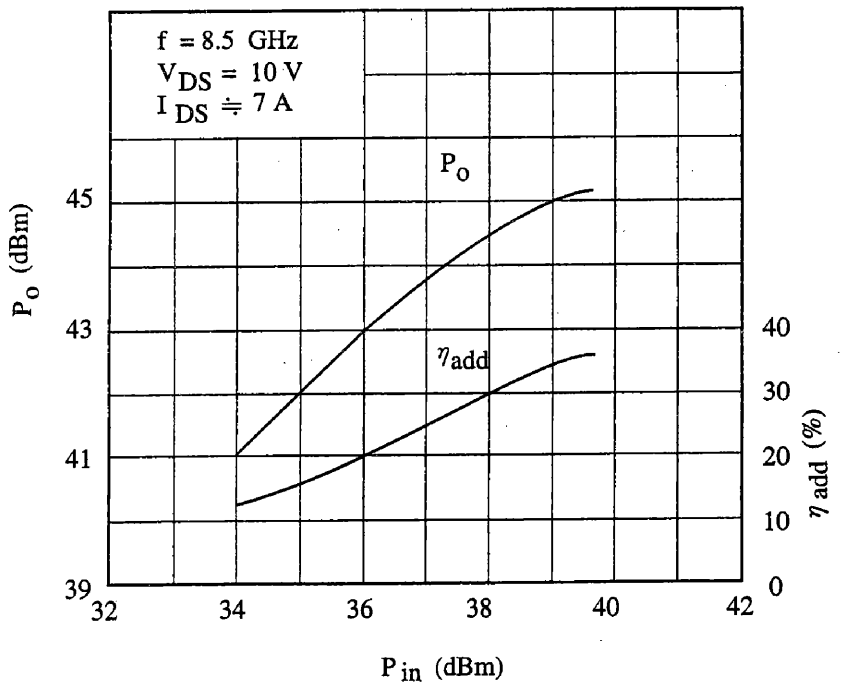
Soldering iron should be grounded and the operating time should not exceed 10 seconds at 260℃.

## RF PERFORMANCES

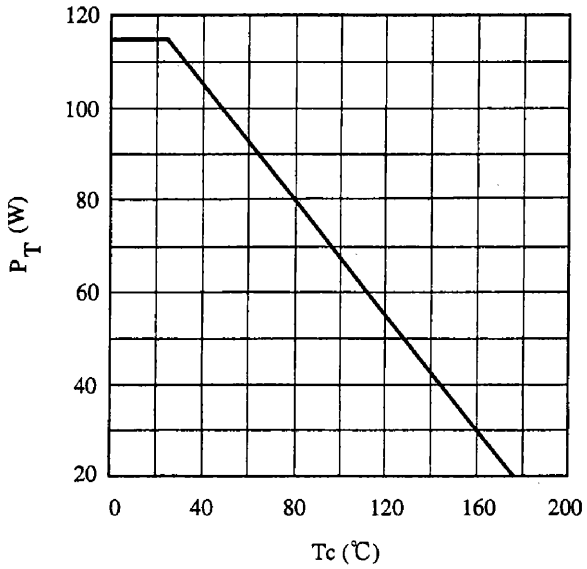
Output Power vs. Frequency



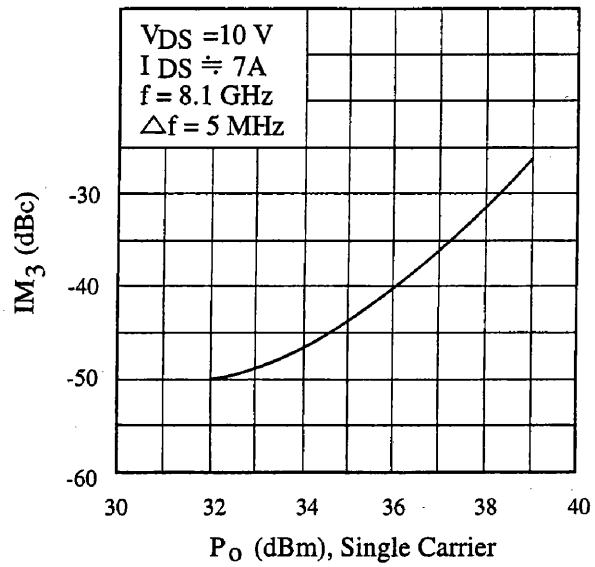

Output Power vs. Input Power



## POWER DISSIPATION VS. CASE TEMPERATURE



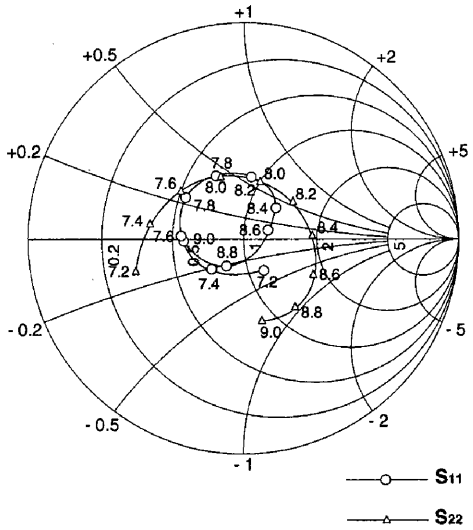

## $IM_3$ VS. OUTPUT POWER CHARACTERISTICS

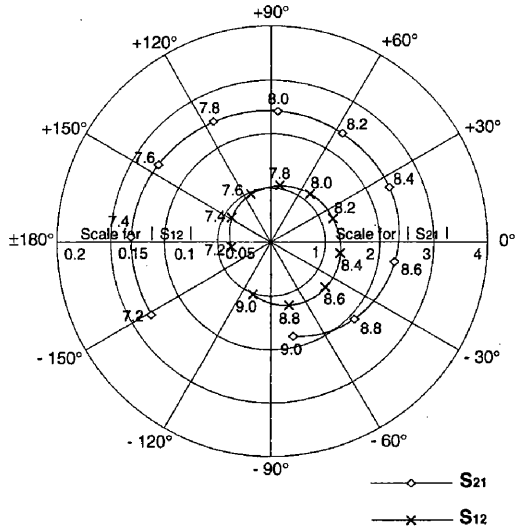


## TIM7785-30SL S-PARAMETERS
## (MAGN.and ANGLES)

$V_{DS}$ = 10V, $I_{DS}$ = 7.0A

f =7.2~9.0GHz




| FREQUENCY (GHz) | S11 MAG | S11 ANG | S21 MAG | S21 ANG | S12 MAG | S12 ANG | S22 MAG | S22 ANG |
|---|---|---|---|---|---|---|---|---|
| 7.2 | 0.17 | -57 | 2.61 | -149 | 0.037 | -173 | 0.52 | -164 |
| 7.4 | 0.20 | -138 | 2.62 | 178 | 0.043 | 148 | 0.44 | 170 |
| 7.6 | 0.29 | 177 | 2.55 | 146 | 0.048 | 113 | 0.37 | 142 |
| 7.8 | 0.33 | 144 | 2.47 | 116 | 0.053 | 81 | 0.31 | 110 |
| 8.0 | 0.32 | 114 | 2.41 | 87 | 0.057 | 51 | 0.28 | 74 |
| 8.2 | 0.29 | 83 | 2.39 | 57 | 0.061 | 21 | 0.29 | 38 |
| 8.4 | 0.21 | 44 | 2.39 | 25 | 0.064 | -9 | 0.32 | 4 |
| 8.6 | 0.12 | 21 | 2.29 | -9 | 0.065 | -40 | 0.36 | -26 |
| 8.8 | 0.15 | -123 | 2.09 | -43 | 0.061 | -74 | 0.39 | -52 |
| 9.0 | 0.28 | -179 | 1.79 | -77 | 0.051 | -109 | 0.38 | -77 |