# 2SK408,2SK409

HITACHI/{OPTOELECTRONIC

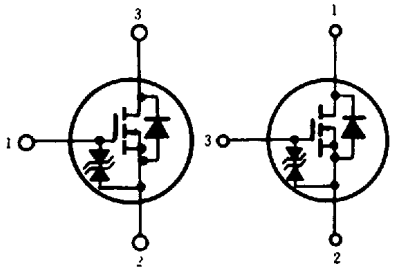
## SILICON N-CHANNEL MOS FET

### HF/VHF POWER AMPLIFIER

2SK408 2SK409

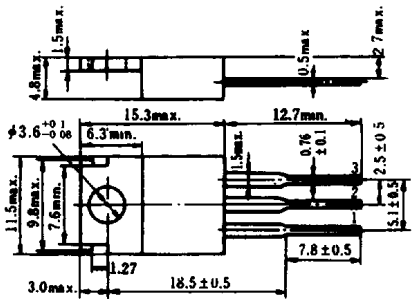
### ■ FEATURES

- High Breakdown Voltage.
- You Can Decrease Handling Current.
- Included Gate Protection Diode.
- No Secondary-Breakdown.
- Wide A.S.O. (Area of Safe Operation)
- Simple Bias Circuitry
- No Thermal Runaway.




2SK408
1 Gate
2 Source
3. Drain

2SK409
1. Drain
2 Source
3. Gate




(Dimensions in mm)

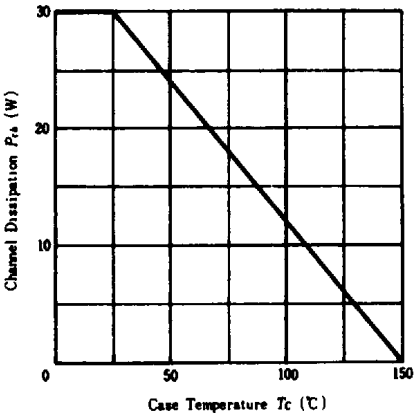
(JEDEC TO-220AB)

### ■ ABSOLUTE MAXIMUM RATINGS ($T_a$=25 °C)

| Item | Symbol | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 180 | V |
| Gate-Source Voltage | $V_{GSS}$ | ±20 | V |
| Drain Current | $I_D$ | 2 | A |
| Channel Dissipation | $P_{ch}$* | 30 | W |
| Channel Temperature | $T_{ch}$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | −55 ~ +150 | °C |

*Value at $T_C$=25 °C

POWER VS. TEMPERATURE DERATING

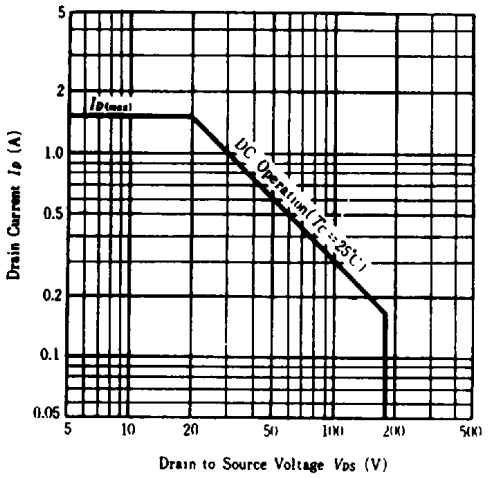



### ■ ELECTRICAL CHARACTERISTICS ($T_a$=25 °C)

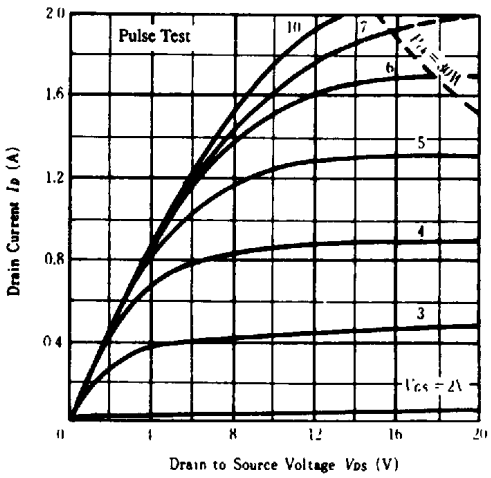
| Item | Symbol | Test Condition | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|
| Power Output | $P_O$ | $V_{DD}$=80V, $f$=28MHz | 10 | 16 | — | W |
| Drain Efficiency | $\eta$ | $I_{DQ}$=50mA, $P_{in}$=150mW | — | 80 | — | % |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=10mA, $V_{GS}$=0 | 180 | — | — | V |
| Gate-Source Cutoff Voltage | $V_{GS(off)}$ | $I_D$=1mA, $V_{DS}$=10V | 0.5 | — | 3.0 | V |
| Drain Current | $I_{DSS}$ | $V_{DS}$=140V, $V_{GS}$=0 | — | — | 1.0 | mA |
| Drain-Source Saturation Voltage | $V_{DS(on)}$ | $I_D$=1.0A, $V_{GS}$=10V* | — | 6.5 | 8.0 | V |
| Forward Transfer Admittance | $\|y_{fs}\|$ | $I_D$=1.0A, $V_{DS}$=20V* | 0.2 | 0.3 | — | S |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=5V, $V_{DS}$=0, $f$=1MHz | — | 100 | — | pF |
| Output Capacitance | $C_{oss}$ | $V_{GS}$=−5V, $V_{DS}$=50V, $f$=1MHz | — | 20 | — | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | $V_{GD}$=−50V, $f$=1MHz | — | 0.2 | — | pF |
| Power Output | $P_O$ | $V_{DD}$=80V, $f$=28MHz | — | 10 | — | $W_{PEP}$ |
| Power Gain | P.G | $\Delta f$=20kHz, IMD≦−30dB | — | 20 | — | dB |

*Pulse Test

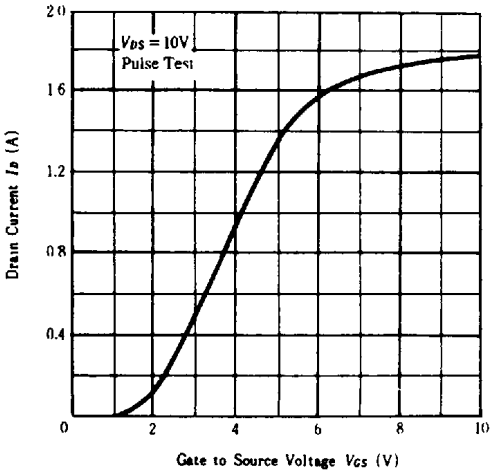
### MAXIMUM SAFE OPERATION AREA



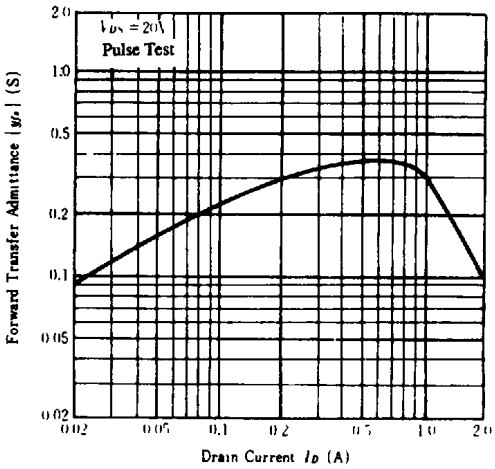

### TYPICAL OUTPUT CHARACTERISTICS



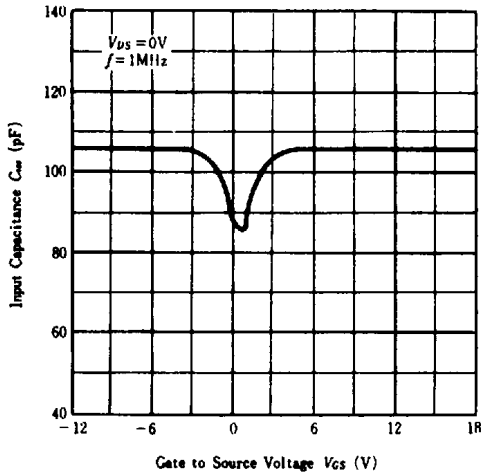

### TYPICAL TRANSFER CHARACTERISTICS



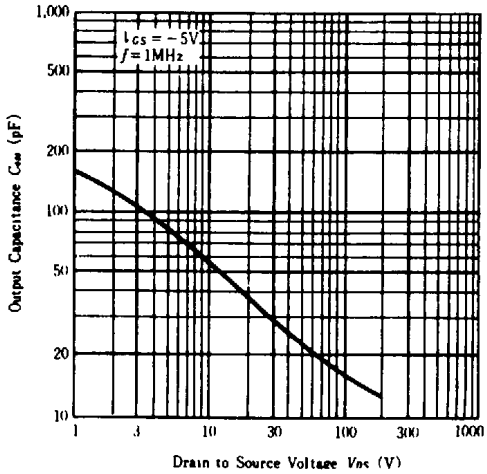

### FORWARD TRANSFER ADMITTANCE VS. DRAIN CURRENT



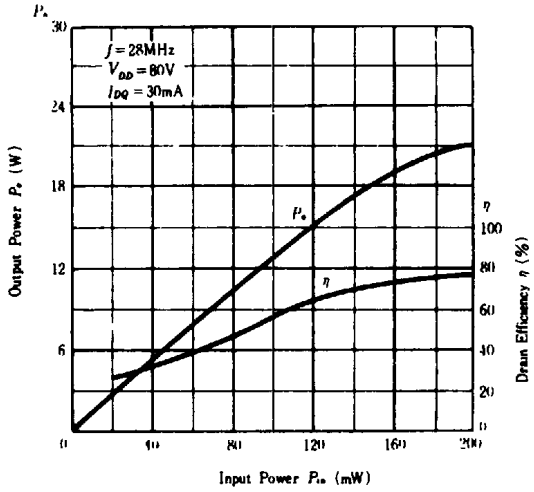

### INPUT CAPACITANCE VS. GATE-SOURCE VOLTAGE



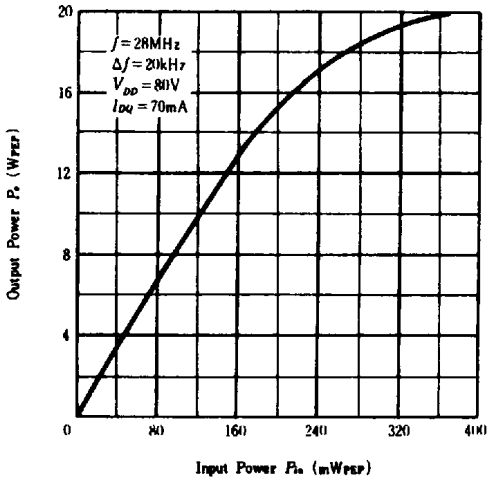

### OUTPUT CAPACITANCE VS. DRAIN-SOURCE VOLTAGE



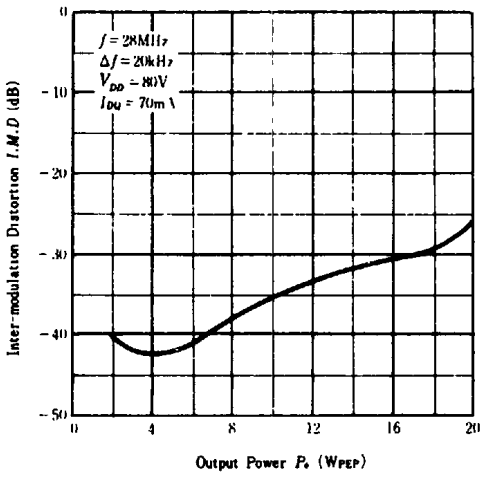
**OUTPUT POWER, DRAIN EFFICIENCY VS. INPUT POWER**



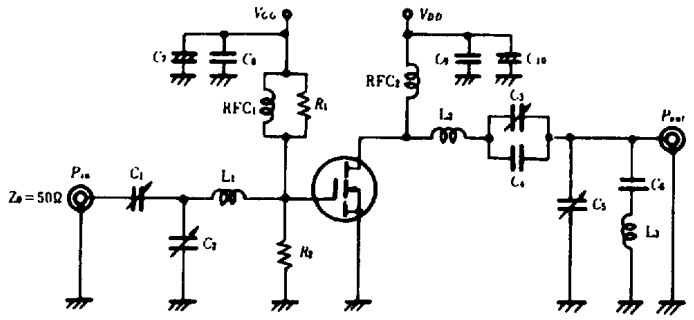

**OUTPUT POWER VS. INPUT POWER (2 TONES)**




**INTER-MODULATION DISTORTION VS. OUTPUT POWER**




**28MHz Pout TEST CIRCUIT**




$C_1$, $C_2$, $C_3$ = ~50pF
$C_4$ = 68pF
$C_5$ = ~20pF
$C_6$ = 1.5pF
$C_7$, $C_8$ = 0.1μF
$C_9$ = 4.7μF
$C_{10}$ = 22μF
$L_1$ : ID = 12mm, d = 1.5mm, T = 6T
$L_2$ : ID = 12mm, d = 1.5mm, T = 9T
$L_3$ : ID = 12mm, d = 1.5mm, T = 5T