

### FEATURES

Low noise and high gain :  
 NF=1.1dB TYP.,  
 Ga=11dB TYP. @VCE=10V,  
 IC=7mA, f=1GHz  
 High power gain : MAG=13dB TYP.  
 @VCE=10V, IC=20mA, f=1GHz.

### APPLICATIONS

For microwave low-noise  
 amplification.

### TRANSISTOR DICE



### PRODUCT DESCRIPTION AND SHORT APPLICATION NOTE

The USM 2SC3356 series of NPN epitaxial silicon transistors, 3-PIN MNIMOLD, is designed for low cost amplifier and oscillator applications. Low noise figures, high gain, and high current capability equate to wide dynamic range and excellent linearity. The USM 2SC3356 series offers excellent performance and reliability at low cost. This is achieved by USM gold metallization system and their direct nitride passivated base surface process.

The USM 2SC3356 series is available in die form for high frequency applications. It is also available in several low cost plastic package styles TO-92 and SOT 89.

### TECHNOLOGY DESCRIPTION: SEMICONDUCTOR-THIN FILM MANUFACTURING

All thin film microwave products are manufactured using advanced semiconductors and thin film technologies including ultra-stable and self passivating Tantalum Nitride resistors, gold interconnect metallization and reliable MNOS capacitors to achieve excellent uniformity, performance and reliability. Thin film technology is the preferred solution for all applications that require low noise, long term stability and excellent performance at very high frequencies. US Microwaves employs proprietary thin film technologies for deposition of a wide range of resistive films with sheet resistance films from 1Ω/sq to 10,000Ω/sq. All US Microwaves products are available in die form and are ideal for high reliability hybrid and multi chip module applications.

All US Microwaves products are manufactured using **GOLD CHIP TECHNOLOGY™** a trade mark of Semiconix Corporation.

### MAXIMUM RATINGS

PARAMETER	VALUE	UNITS
V <sub>CBO</sub> , Collector-base voltage, open emitter	20	V
V <sub>CEO</sub> , collector-emitter voltage, open base	12	V
V <sub>EBO</sub> , emitter-base voltage, open collector	3	v
I <sub>C</sub> , collector current (DC)	100	mA
P <sub>tot</sub> , total power dissipation, T <sub>amb</sub> = 25 °C, free air	200	mW
T <sub>j</sub> , junction temperature	150	°C
T <sub>stg</sub> , storage temperature	-65 to +150	°C

ONLY Proper die handling equipment and procedures should be employed. Stresses beyond listed absolute maximum ratings may cause permanent damage to the device. Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

### ELECTRICAL CHARACTERISTICS (25°C unless otherwise specified)

PARAMETER	VALUE	UNITS
I <sub>CBO</sub> , collector cut-off current, I <sub>E</sub> = 0; V <sub>CB</sub> = 10 V	max. 1.0	mA
I <sub>EBO</sub> , emitter cut-off current, I <sub>C</sub> = 0; V <sub>EB</sub> = 1 V	max. 1.0	mA
h <sub>FE</sub> , DC current gain, I <sub>C</sub> = 20 mA; V <sub>CE</sub> = 10 V; Pulse measurement: PW = 350 μs, Duty Cycle = 2%	min 50 typ. 120 max 250	
f <sub>T</sub> , Gain Bandwidth Product, V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA	typ. 7	GHz
/S21e/2, Insertion Power Gain, V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA, f = 1 GHz	typ. 11.5	dB
NF, Noise Figure, V <sub>CE</sub> = 10 V, I <sub>C</sub> = 7 mA, f = 1 GHz	typ. 1.1 max 2.0	dB
C <sub>re</sub> , Reverse Transfer Capacitance, V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 mA, f = 1 MHz (Note 1)	typ. 0.55 max 1	pF

Note 1. Collector to base capacitance when the emitter grounded

### GENERAL DIE INFORMATION

Substrate	Thickness [mils]	Die Size [mils]	Bonding Pads	Backside metal
Silicon	6±0.5	14 × 14±1	min 3 mils, 3μm thick, 99.99% AuSn electroplated gold with a TiW barrier	Standard electrode metallization is Gold over Nickel compatible with epoxy, AuGe, die attaching and thermal compression or ultrasonic wire bonding. Gold over platinum is available on special request with custom designs.

All US Microwaves products are available in die form. Typical delivery for die products is 2-3 weeks ARO. For Custom designs, delivery is 3-4 weeks ARO. Certain items may be available from stock. Inventory is periodically updated. All devices for chip and wire applications are 100% tested, visual inspected and shipped in waffle packs (WP). For high volume automated assembly, MIS chip capacitors are supplied as 4" wafers 100% tested, inked and diced on expanded film frame (FF).

### DIE LAYOUT

