



**0.5- $\mu$ m 2MI Process Cross Section**

## General Description

The 0.5- $\mu$ m Intermediate-Profile, High-Current MesFET (IPHC) process is a cost-effective 2MI (2-metal-interconnect) depletion-mode ion-implant MesFET process for general-purpose and high-power operation through 20 GHz. The IPHC process allows for active switch, amplifier, and diode integration. This process is typically used for amplifiers, switches, doublers, mixers and VCO's in various applications. Passives include 2 thick-metal interconnect layers, precision TaN resistors, GaAs resistors, MIM capacitors, and through-substrate vias. The via-under-cap process aids in size compaction and offers excellent grounds at higher frequencies.

## Features

- 0.5- $\mu$ m amplifier transistors
- 0.5- $\mu$ m switch transistors
- 0.5- $\mu$ m diodes
- Device passivation
- High-Q passives
- MIM capacitors
- TaN resistors
- GaAs resistors
- 2 metal layers
- Air bridges
- Substrate vias
- Operation up to  $V_d = 8$  V

## Applications

- Up to 20 GHz
- Communications
- Space
- Military
- Power amplifiers
- Driver amplifiers
- AGC amplifiers
- Limiting amplifiers
- Transimpedance amplifiers
- Differential amplifiers
- Digital and analog phase shifters
- Digital and analog attenuators
- Mixers (up and down converters)
- Multipliers
- Switches
- Oscillators

0.5- $\mu\text{m}$ IPHC MesFET Process Details			
Element	Parameter	Typical Value	Units
FETs	$I_{dss}$	320	mA/mm
	$G_m$	165	mS/mm
	$V_{bd}$	-14	V
	$V_p$	-3	V
MIM capacitors	density	300	pF/mm <sup>2</sup>
Capacitors over vias		yes	
TaN resistors	sheet resistance	50	$\Omega/\text{sq}$
GaAs resistors	sheet resistance	325	$\Omega/\text{sq}$
Vias		yes	
Substrate	thickness	100	$\mu\text{m}$

FET Models Available (Noise)		
Gate Pitch ( $\mu\text{m}$ )	Gate Fingers	FET Sizes ( $\mu\text{m}$ )
26 26	4	300
38 38	10	600

## Application Examples

### Gain Block Amplifier TGA8300-SCC:

The TriQuint TGA8300-SCC is a GaAs monolithic distributed amplifier designed for use as a multi-octave general-purpose gain block.

### 6 to 18 GHz Power Amplifier TGA8014-SCC:

The TriQuint TGA8014-SCC is a two-stage GaAs monolithic medium-power amplifier which provides 11-dB nominal gain with 16% typical power added efficiency and output power at 1-dB gain compression of 0.5 Watt.

### Prototyping and Development

- Prototype Wafer Option (PWO)
  - Customer-specific masks
  - Customer schedule
  - 2 wafers delivered
  - Backside via process included
  - PCM (process control monitor) qualified wafers

### Design Tools

- Device libraries of circuit elements:
  - FETs
  - Thin-film and implanted resistors
  - Capacitors
  - Inductors
- Agilent ADS design kit
- MASC Library

### Training

- GaAs design classes:
  - Half-day introduction upon request
  - 3-day technical training upon request at the TriQuint Texas facility

### Process Status

- 0.5- $\mu$ m Intermediate-Profile, High-Current MesFET (IPHC) is fully released and qualified
- Contact TriQuint or visit <http://www.triquint.com/company/quality/> for more information on quality and reliability.

### Applications Services

- Tiling of GDSII stream files including PCM (process control monitor)
- Design rule checking
- Layout versus schematic checking
- Engineering:
  - On-wafer DC test
  - On-wafer RF test
  - Thermal analysis
  - Yield enhancement
- Part qualification
- Failure analysis
- Space Qualification

### Manufacturing Services

- Mask making
- Wafer thinning
- Wafer dicing
- Substrate vias
- DC die-sort testing
- RF die-sort testing
- Final visual inspection