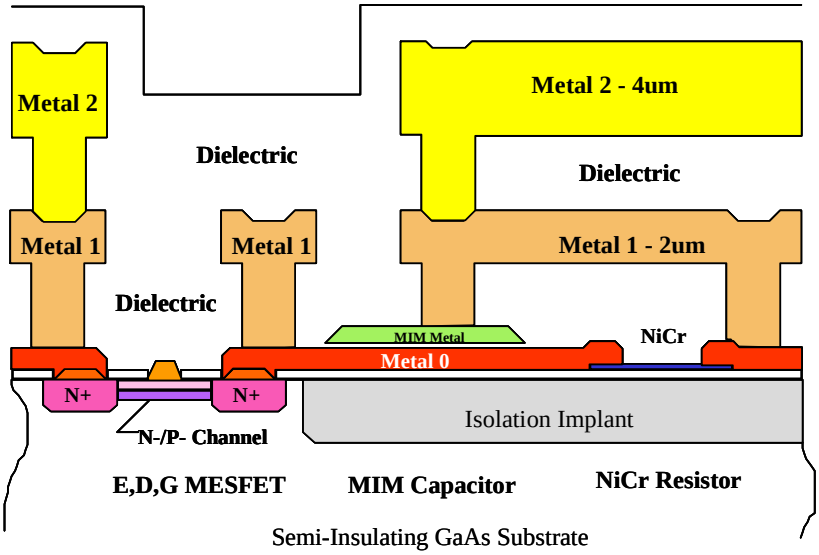
TQTRx

GaAs MESFET Foundry Service



TQTRx Process Cross-Section

General Description

TriQuint's TQTRx is an advanced 0.6 µm enhancement/ depletion mode MESFET process with an integrated power MESFET, general purpose D-Mode MESFET and Enhancement Mode MESFET. This process supports RF and mixed mode applications from RF to microwave frequencies. High density interconnections are accomplished with two thick global and one local metal interconnect layers. The three metal layers are encapsulated in a high performance dielectric that allows wiring flexibility and plastic packaging simplicity. Precision NiCr resistors and high value MIM capacitors are included. The TQTRx process is currently TriQuint's highest volume process and is manufactured on 150-mm (6 inch) wafers.

Features

- 0.6 µm Gate Length MESFET Process
- 4 Active Devices:
  - Power & Gain D-FETs
  - E-FET
  - Schottky-Barrier Diodes
- High Density Interconnects:
  - 2 Global and 1 local
  - 6 µm total thickness
- High-Q Passives
- Bulk & Thin Film Resistors
- High Value Capacitors
- Dielectric Encapsulated Metals
- Planarized Surface; simplified plastic packaging
- Substrate Vias Available
- Volume Production Process
- Validated Models and Design Support

Applications

- Flexible Process Supports:
  - Low Supply Voltage Capability
  - 3V PA's, Driver Amps, Upconverters
  - LNAs and Downconverters down to 1V
  - Integrated Transceivers: LNA + Sw + PA, UPC + PA
  - Fiber-Optic TIA and Laser Diode Drivers
- Mobile Phone Front End Blocks:
  - Cell Band
  - PCS Band
  - GSM Band
- WLAN:
  - ISM
  - HYPERLAN2
  - UNII

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TQTRx Process Details

Element	Parameter	Value	Units
Gate Length	(All FETs)	0.6	µm
E-FET;	Threshold Voltage	+0.15	V
	Imax	90	mA/mm
	Gm	225	mS/mm
	Breakdown, Vgd	22	V
	Fmin, 6 GHz	0.90	dB
D-FET	Pinchoff Voltage	-0.6	V
	Idss	70	mA/mm
	Gm	200	mS/mm
	Breakdown, Vgd	18.5	V
	Fmin, 6 GHz	0.54	dB
G-FET	Pinchoff Voltage	-2.2	V
	Idss	270	mA/mm
	Imax	400	mA/mm
	Gm	170	mS/mm
	Breakdown, Vgd	19	V
	Fmin, 6 GHz	0.66	dB
Interconnects		3	Metal Layers
N+ Diode	V forward	0.55	V
MIM Caps	Values	1200	pF/mm2
Resistors	NiCr	50	Ohms/Sq
	Bulk	700	Ohms/sq
Vias		Yes	
Mask Layers	No Vias	16	
	With Vias	18	

Maximum Ratings

FET Operating Channel Temp		-55 to +150	Deg C
Capacitor Breakdown Voltage	- Design	10	V
	- Typical	20	V

Specifications Subject to Change

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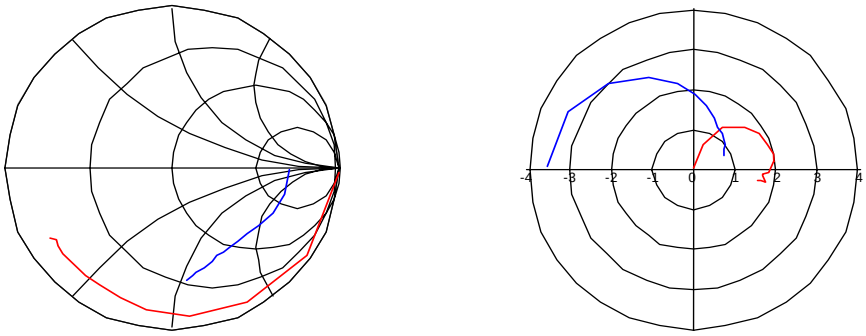
GFET
300 um
Vds=3V
50% Idss

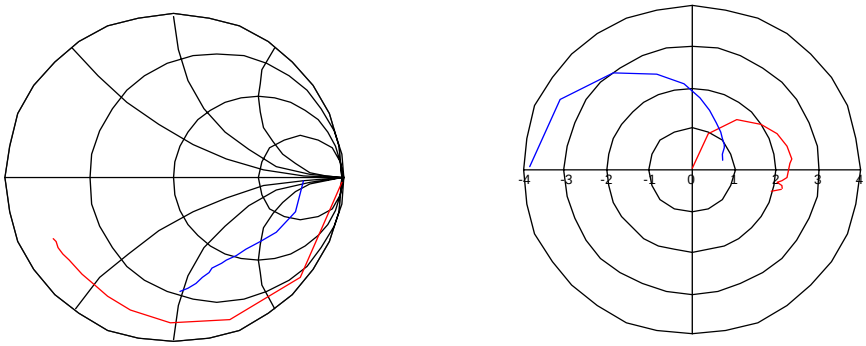


S11
S22

Freq (0.1GHz to 26.1GHz)

S12 / .05
S21

DFET
300 um
Vds=3V
50% Idss



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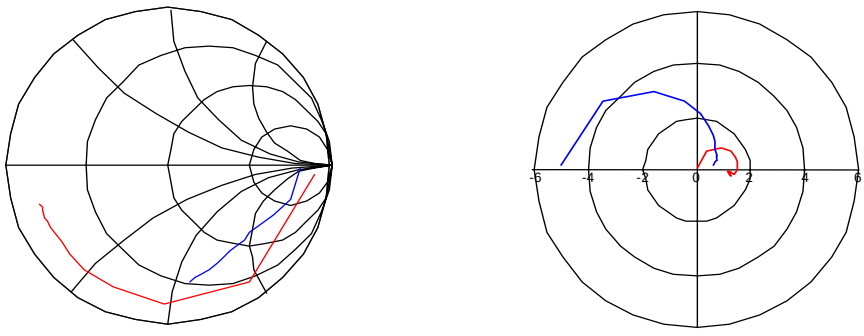
S22

Freq (0.1GHz to 26.1GHz)

S12 / .05
S21

EFET
300 um
Vds=3V
50% Idmax



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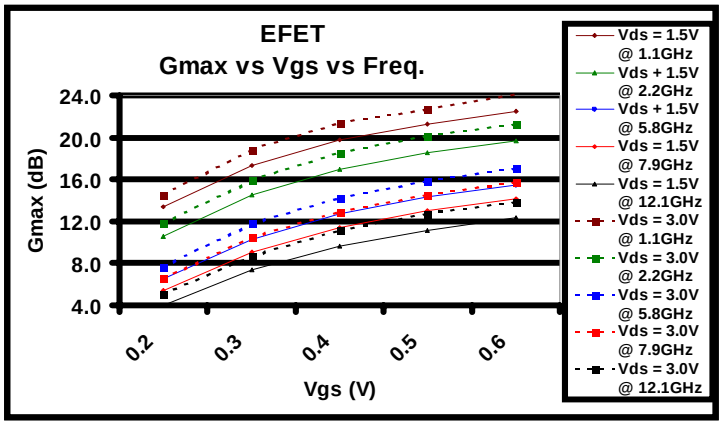
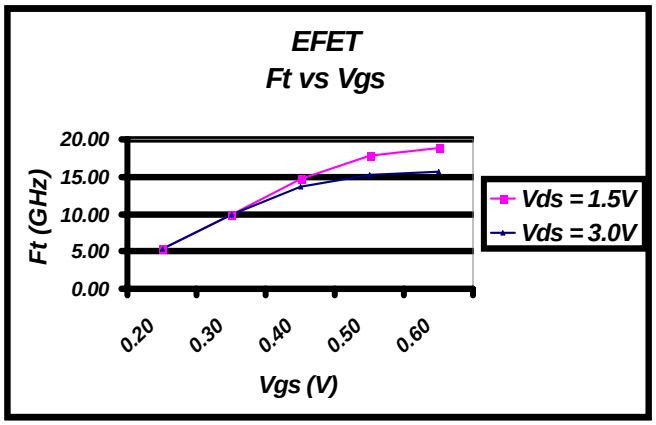
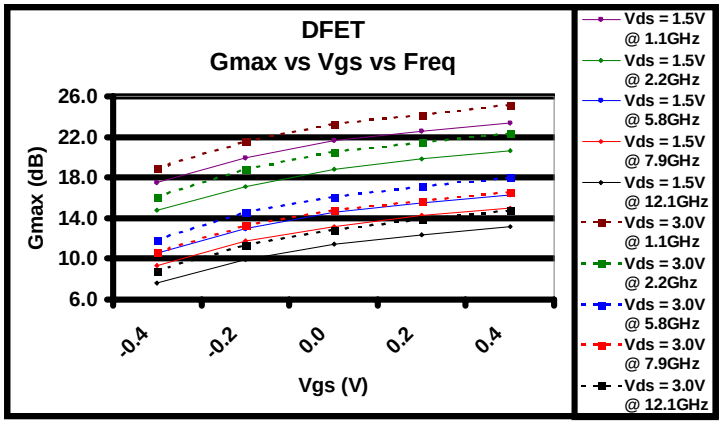
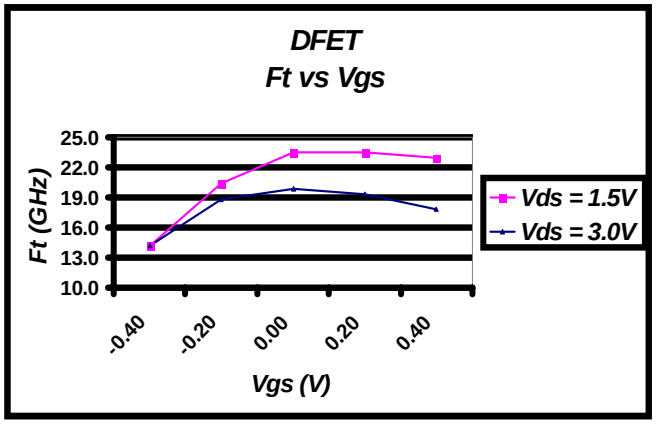
Gmax vs Vgs vs Frequency
300 um FETs; Three Types
Vds = 1.5 & 3.0 V; T=27°C

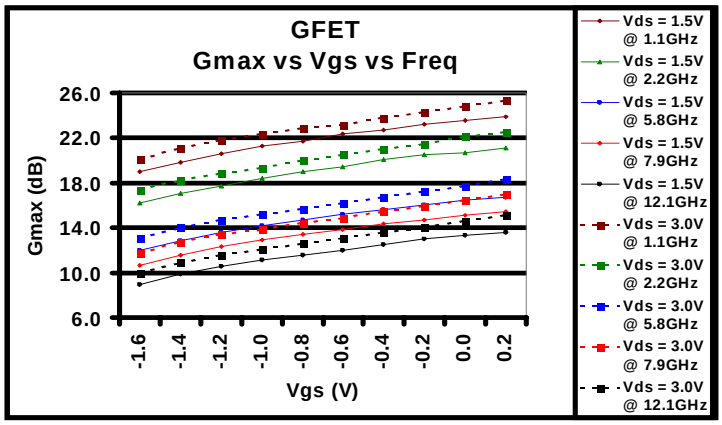
Ft versus Vgs;
300 um FETs; Three Types;
Vds = 1.5 & 3.0 V; T=27°C

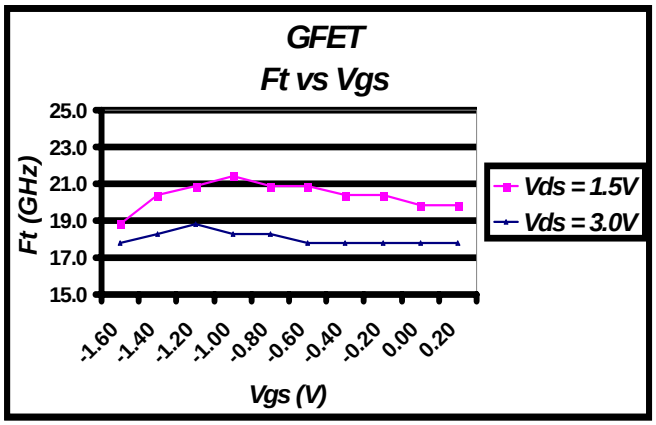












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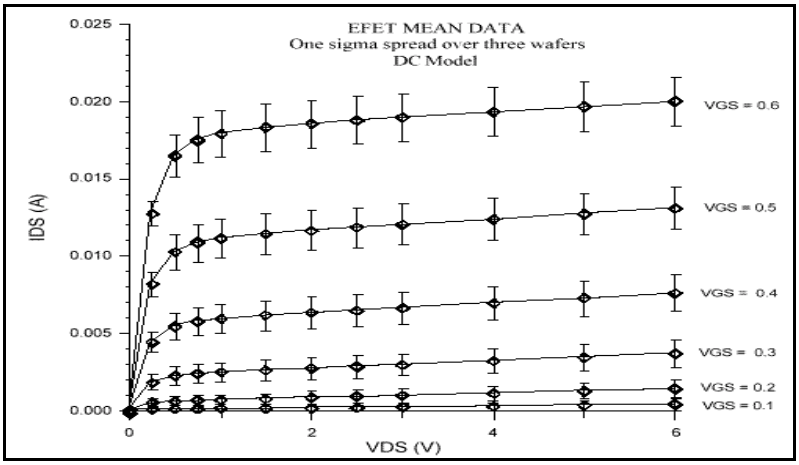
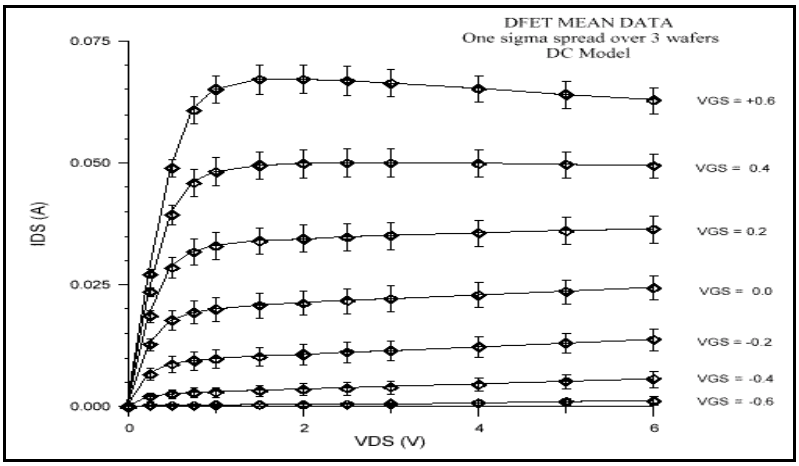
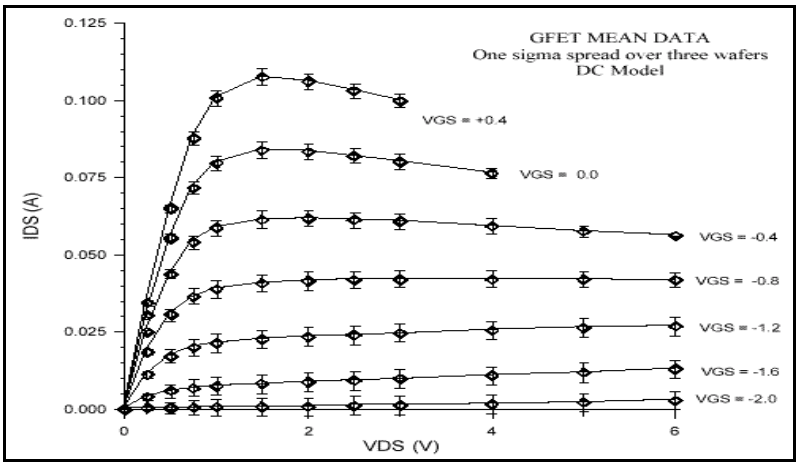
EFET
IV Curves
300 um



DFET
IV Curves
300 um



GFET
IV Curves
300 um



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Applications Examples

TQ5M31; 3V Downconverter Mixer IC:

General purpose RFIC mixer downcnverter; RF range = 500 to 2,500 MHz; IF output range 45 to 500 MHz; PCS, ISM, GPS, L-Band Satellite and WLAN applications.

Parameter	Min	Typ	Max	Units
Conversion Gain		4.0		dB
Noise Figure		8.5		dB
Input 3OIP		9.0		dB
DC Supply Current		6.2		mA

(Full Datasheet at: www.tqs.com/Wireless/Products/TQ5M31/TQ5M31.pdf)

TQ3M31; Dual Band LNA:

For Cellular and PCS band CDMA/AMPS applications; IS-95 and AMPS compliant; On-Chip switches for mode selection.

Parameter	Typ @ 881 MHz	Typ@ 1960 MHz	Units
Gain 881 MHz	13.0	13.5	dB
Noise Figure	1.4	1.5	dB
Input 3OIP	12.5	9.0	dBm
DC Supply Current	10.0	11.0	mA

(Full Datasheet at: www.tqs.com/Wireless/Products/TQ3M31/TQ3M31.pdf)

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Prototyping and Development

- Prototype Development QuickTurn (PDQ):
  - Shared Mask Set;
  - Run Monthly
  - Hot Lot Cycle Time
  - Via and Non-Via Options
- Prototype Wafer Option (PWO):
  - Customer-specific Masks, Customer Schedule
  - 2 wafers delivered
  - Hot Lot Cycle Time
  - With thinning and sawing; optional backside vias
- Design Sensitivity Test (DST) Wafer Run
  - Yield Analysis
  - Design Sensitivity to Process Variation
  - 14 Wafer Start; Spread of Vp Values

Design Tools Available

- Device Library of Circuit Elements: FETs, Diodes, Thin Film and Implanted Resistors, Capacitors, Inductors
- Parameters for "TriQuint's Own Model" (TOM)
- Agilent ADS Design Kit Available Now
- PSPICE and MWO Models Available Now
- Layout Libraries Available for ICED, Cadence and MWO Now
- Verification Kit for ICEditors Now
- Qualified Package Models for Supported Package Styles

Training

- GaAs Design Classes:
  - Half Day Introduction; Upon Request
  - Four Day Technical Training; Fall & Spring at TriQuint Oregon facility
- For Training & PDQ Schedules, please visit: www.triquint.com/foundry/

Process Qualification Status

- TQTRx is fully released and qualified
- Reliability Reports:
  - TQTRx Process Qualification
  - High Power Product Qualification
  - TQTRx Element Qualification Report
- For more information on Quality and Reliability, contact TriQuint or visit www.tqs.com/Manufacturing/QR/bdy_qr-pubs.htm.

Applications Support Services

- Tiling of GDSII Stream Files including PCM
- Design Rule Check Services
- Layout versus Schematic Check Services
- Packaging Development Engineering
- Engineering Services
  - On-Wafer Test
  - Packaged Parts Test
  - Thermal Analysis
  - Yield Enhancement
- Part Qualification Services
- Failure Analysis

Manufacturing Services

- Mask Making
- Production 150 mm Wafer Fab
- Wafer Thinning
- Wafer Sawing
- Substrate Vias
- DC Die Sort Testing
- RF On-Wafer Testing
- Plastic Packaging
- RF Packaged Part Testing

Please contact your local TriQuint Semiconductor Representative or Foundry Services Staff for additional information:
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