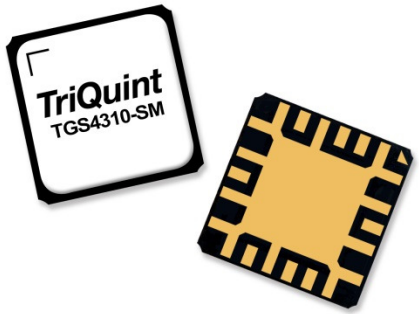
TGS4310-SM

13-19GHz 2W SPDT Switch

Applications

- Commercial and Military Radar
- Satellite Communications
- General Puerpose Switching

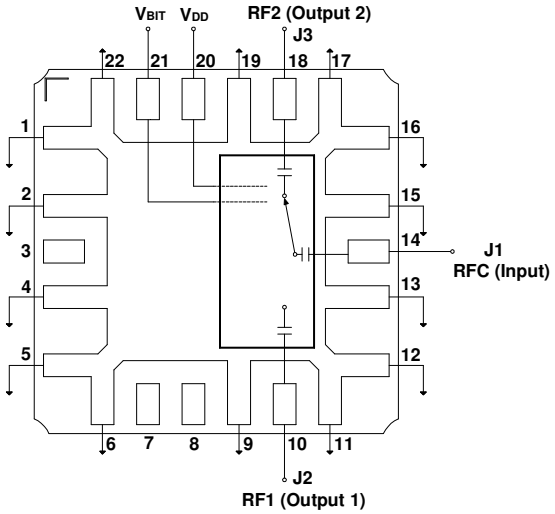


QFN 4x4 mm 22L

Product Features

- SPDT, Reflective Switch
- Frequency Range: 13 - 19 GHz
- Insertion Loss: < 1.7 dB
- Power Handling: 2 W (P-0.1dB)
- ITOI: 55 dBm (at P_{IN}/Tone = 22 dBm)
- Isolation: > 20 dB
- Switching Speed: 20 ns
- Control Voltages: V_{DD} = 3.3 - 5 V, V_{BIT} = 0/V_{DD} V
- Process Technology: GaAs-PHEMTES15-DR
- Package Dimensions: 4.0 x 4.0 x 1.47 mm

Functional Block Diagram



General Description

The TGS4310-SM is a packaged single-pole, double-throw (SPDT) reflective switch operating from 13 to 19 GHz. With an insertion loss of <1.7 dB, the TGS4310-SM supports 2 W of incident power at 0.1 dB compression.

For mechanical robustness and ease of handling, the TGS4310-SM is available in a low-cost, 4x4 mm air-cavity ceramic QFN. Fully matched to 50 ohms at all ports, it uses standard positive control voltages and requires very little control current making system integration simple without impacting DC power budgets.

The TGS4310-SM is ideally suited for a variety of Ku-band switching applications across both defense and commercial applications.

Lead-free and RoHS compliant

Evaluation Boards are available upon request.

Pin Configuration

Pad No.	Symbol
1, 2, 4, 5-6, 9, 11-13, 15-17, 19, 22	GND
3, 7, 8	NC
10	RF1
14	RFC
18	RF2
20	V_{DD}
21	V_{BIT}
23	GND Paddle

Ordering Information

Part	ECCN	Description
TGS4310-SM	EAR99	13-19GHz 2W SPDT Switch

Absolute Maximum Ratings

Parameter	Value
Voltages (V_{DD}, V_{BIT})	6 V
Currents (I_{DD}, I_{BIT})	-1.7 / +1.7 mA
Power Dissipation, T_{BASE} = 85 ℃	1.8 W
Input Power (P_{IN}), CW/Pulsed, 50 Ω, 85℃	34 dBm
Input Power (P_{IN}), hot switching, 90/10%, 45 ns speed, 50% duty cycle	33 dBm
Channel Temperature (T_{CH})	200 ℃
Mounting Temperature (30 sec)	260 ℃
Storage Temperature	-55 to 150 ℃

Operation of this device outside the parameter ranges given above may cause permanent damage. These are stress ratings only, and functional operation of the device at these conditions is not implied.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Frequency	13		19	GHz
Input Power Handling (CW/Pulsed RF)		≤ 33		dBm
Reference Voltage, V_{DD}		3.3 - 5		V
Control Voltage, V_{BIT}		0/V_{DD}		V
Currents (I_{DD}, I_{BIT})	See plots p. 7			
Operating Temperature	-40		+85	℃

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications

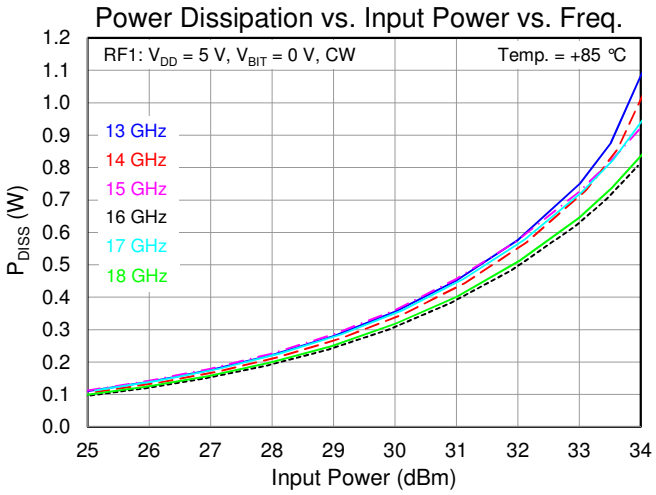
Test conditions unless otherwise noted: V_{DD} = 5 V, V_{BIT} = 0/5 V, Temp= +25℃. Z_0 = 50 Ω

Parameter	Min	Typical	Max	Units
Operational Frequency Range	13		19	GHz
Input Power at 0.1 dB Gain Compression (P-0.1dB)		33		dBm
Insertion Loss		< 1.7		dB
Isolation		> 20		dB
Input Return Loss – On-State (Common Port RL)		> 12		dB
Output Return Loss – On-State (Switched Port RL)		> 12		dB
Output Return Loss – Off-State (Isolated Port RL)		< 1		dB
Input TOI at P_{IN}/Tone = 22 dBm (ITOI)		55		dBm
IM3 at P_{IN}/Tone = 22 dBm		-75		dBc
IM5 at P_{IN}/Tone = 22 dBm		-75		dBc
Insertion Loss Temperature Coefficient		0.003		dB/℃
Switching Speed (90/10%)		20		ns

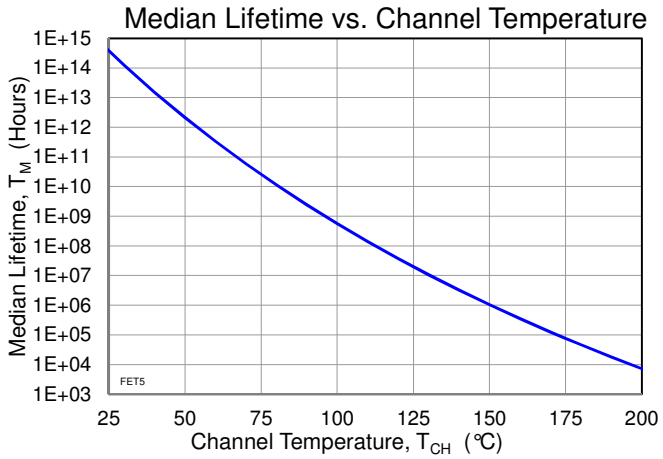
Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC}) (1)	T_{BASE} = 85 °C, V_{DD} = 5 V, V_{BIT} = 0/5 V, CW, Frequency = 13 GHz, P_{IN} = 33 dBm (2 W), Insertion Loss = 2 dB, P_{OUT} = 31 dBm (1.25 W), P_{DISS} = 0.75 W	60	°C/W
Channel Temperature (T_{CH}) (Under RF drive)		130	°C
Median Lifetime (T_M)		1.1E+7	Hrs

Notes:
1. Thermal resistance measured to back of package.

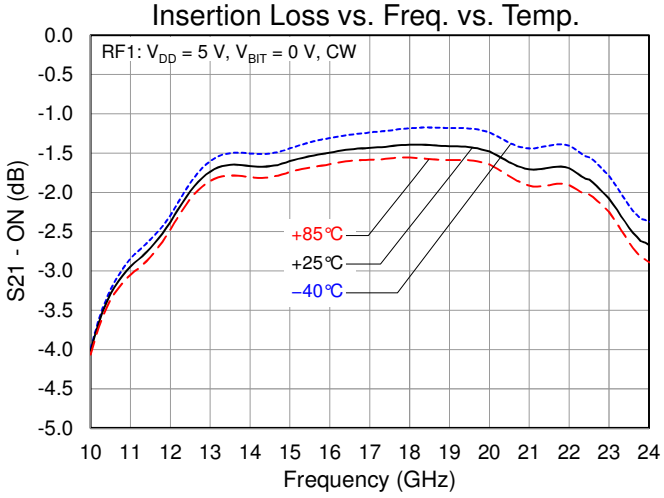


Test Conditions: V_D = 7 V; Failure Criteria = 10% reduction in I_{D_MAX}

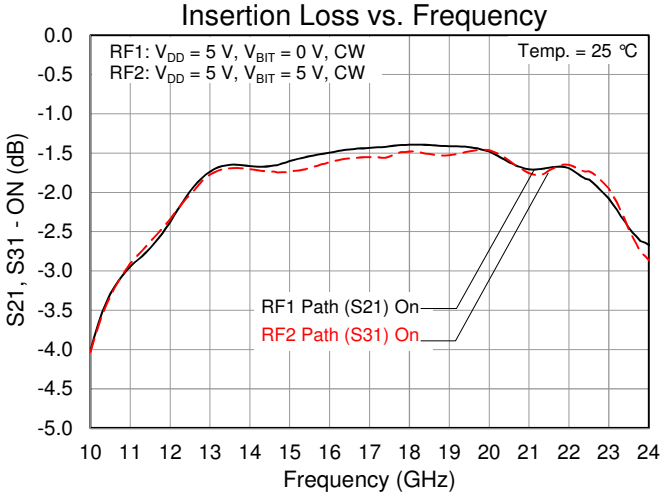


Typical Performance: Small Signal

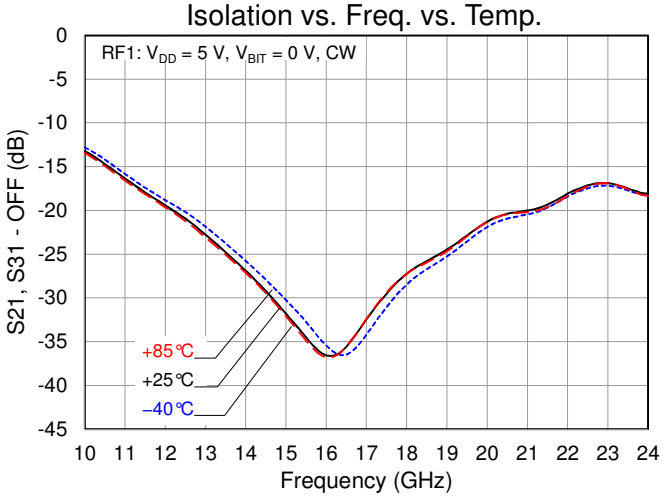
Insertion Loss vs. Freq. vs. Temp.



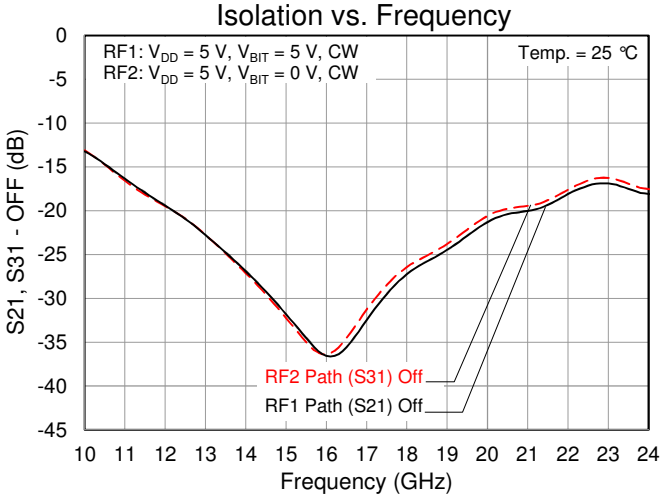
Insertion Loss vs. Frequency



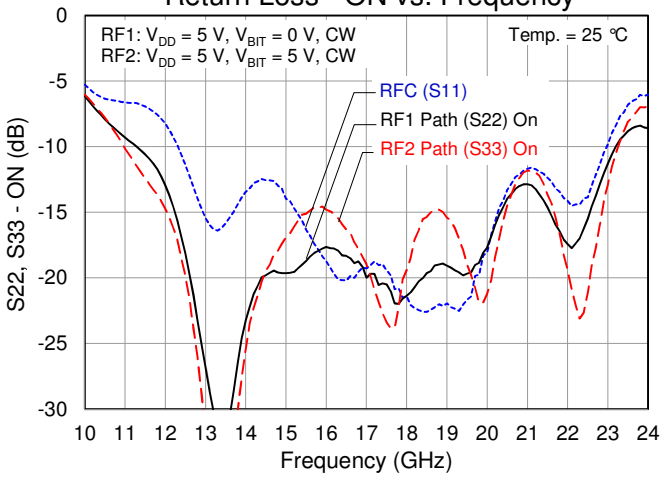
Isolation vs. Freq. vs. Temp.



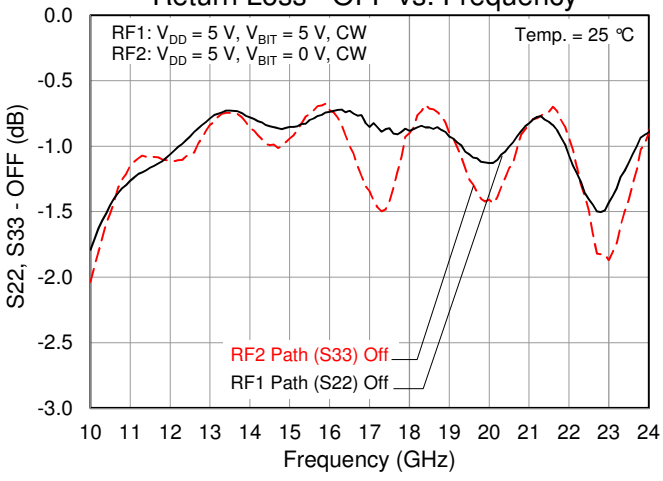
Isolation vs. Frequency



Return Loss - ON vs. Frequency

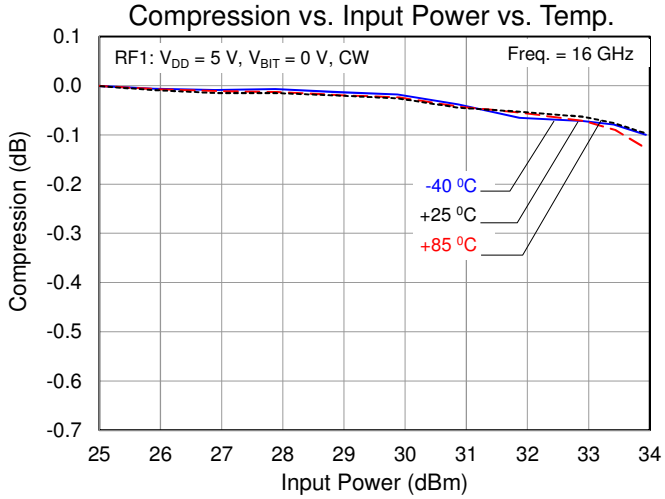


Return Loss - OFF vs. Frequency

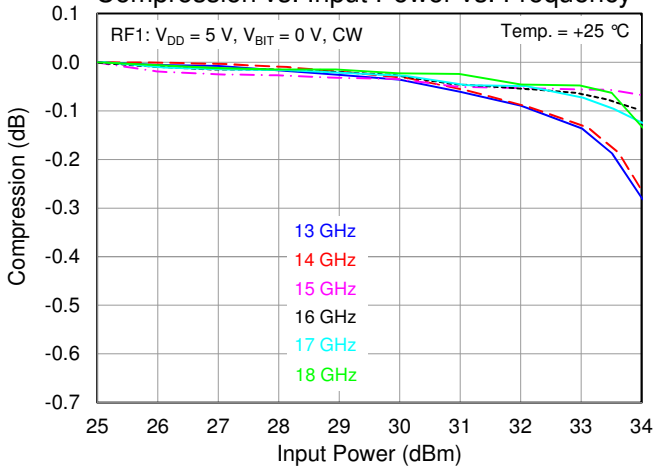


Typical Performance: Large Signal - CW

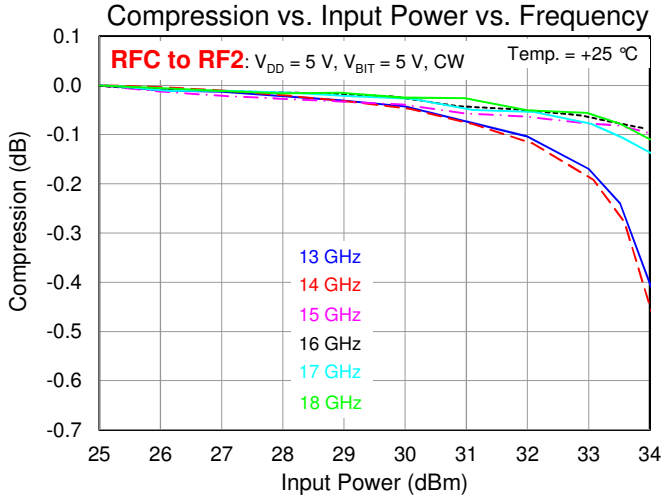
Compression vs. Input Power vs. Temp.



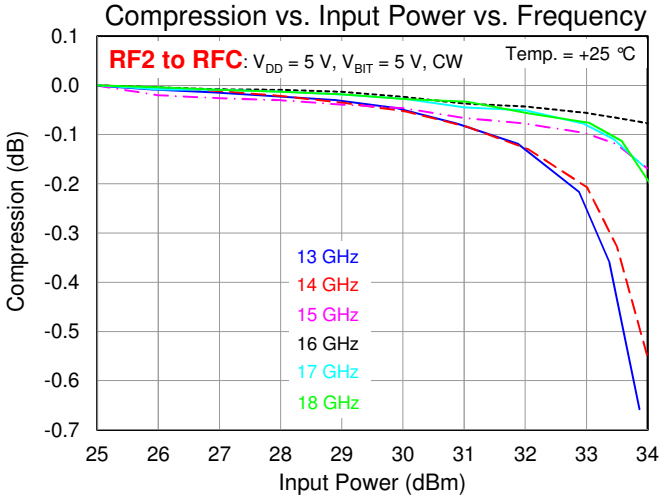
Compression vs. Input Power vs. Frequency



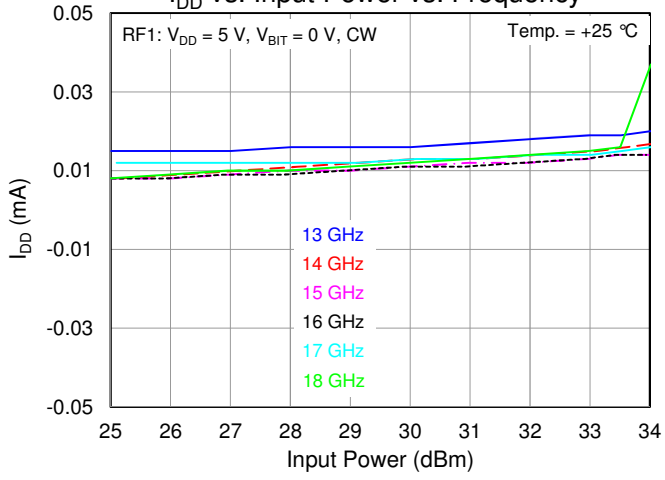
Compression vs. Input Power vs. Frequency



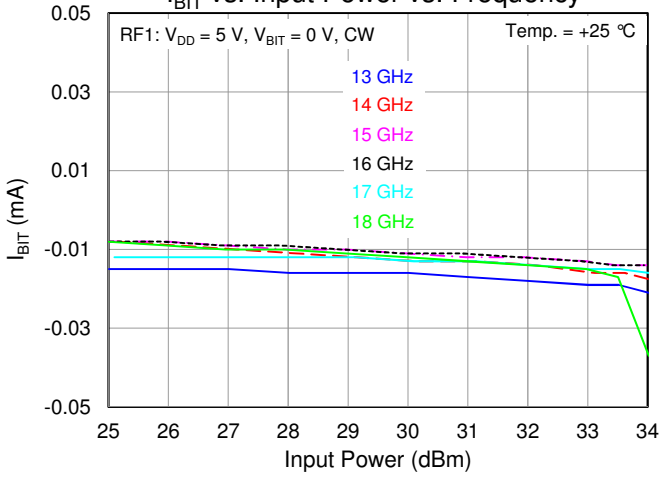
Compression vs. Input Power vs. Frequency



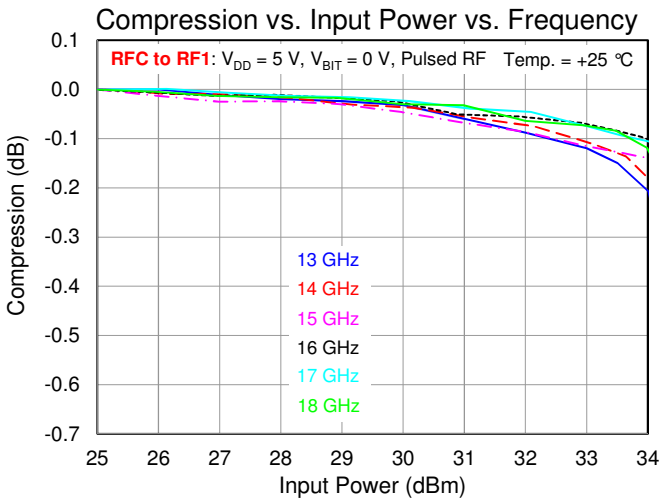
I_{DD} vs. Input Power vs. Frequency

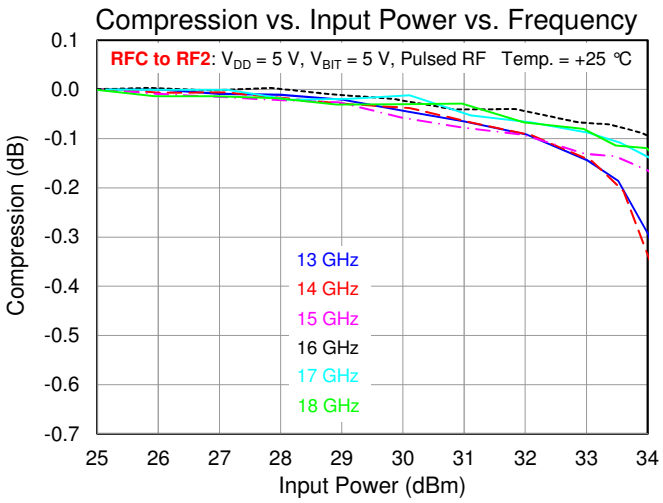


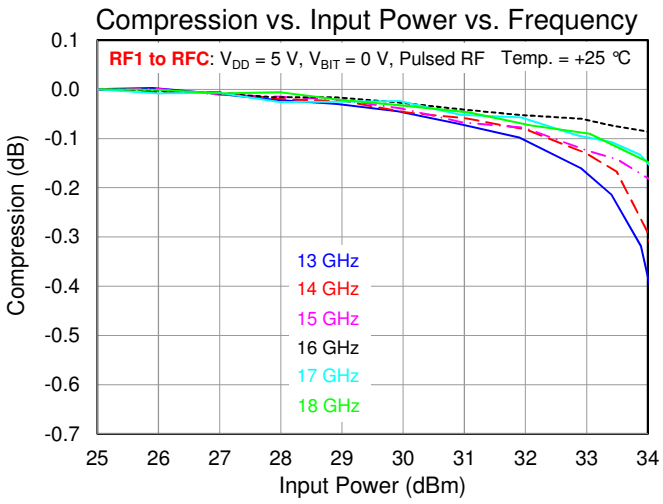
I_{BIT} vs. Input Power vs. Frequency

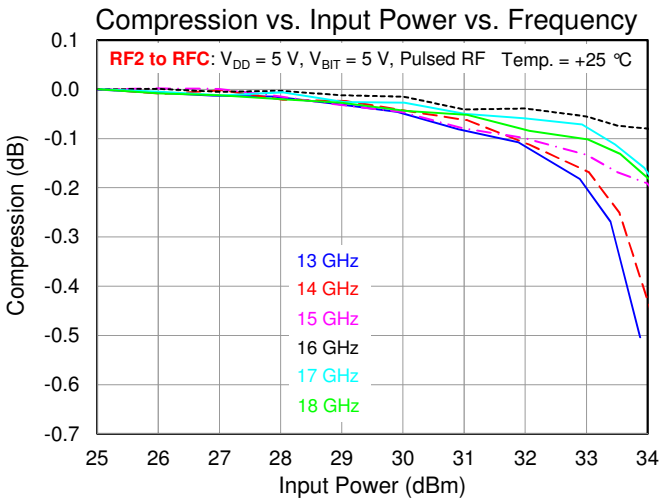


Typical Performance: Large Signal – Pulsed RF (PW = 10 us, DC = 10 %)



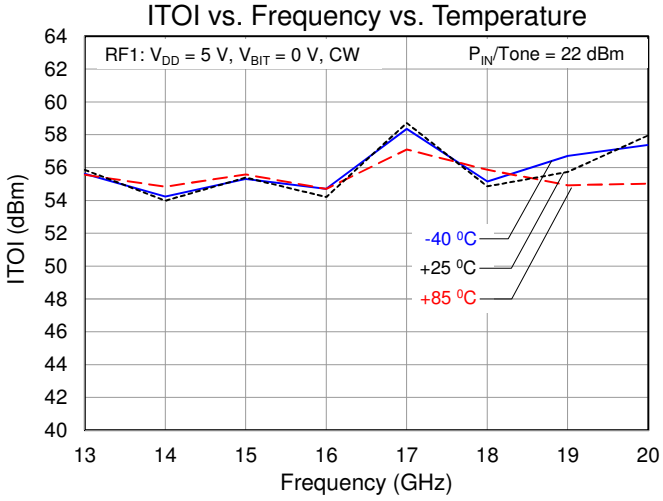




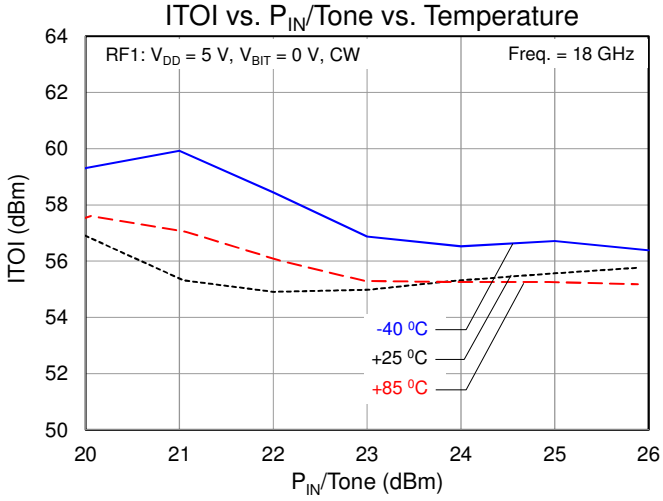


Typical Performance: Linearity

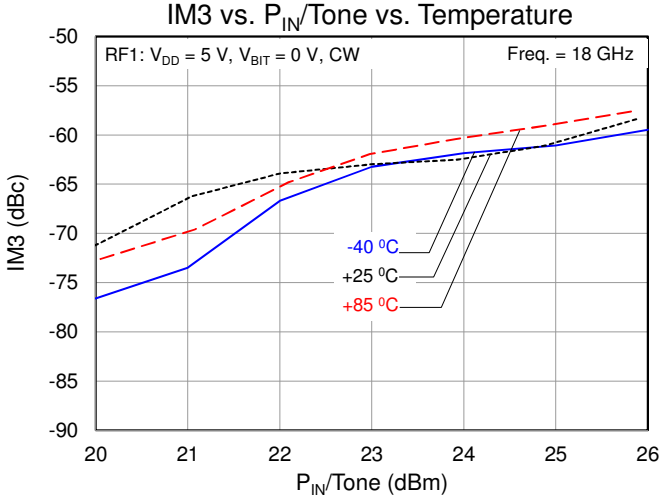
ITOI vs. Frequency vs. Temperature



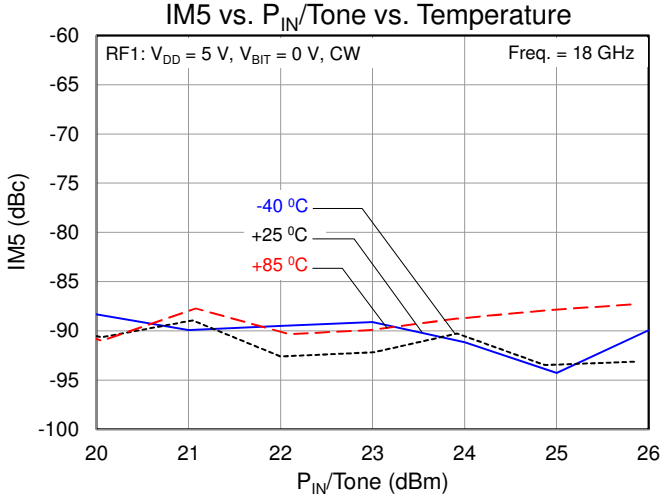
ITOI vs. P_{IN}/Tone vs. Temperature



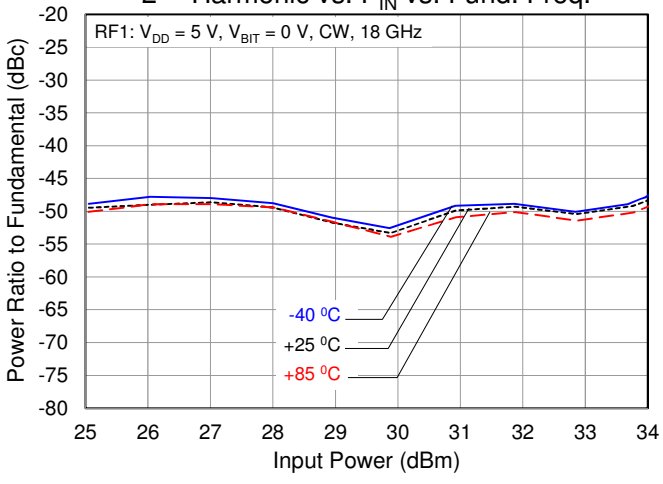
IM3 vs. P_{IN}/Tone vs. Temperature



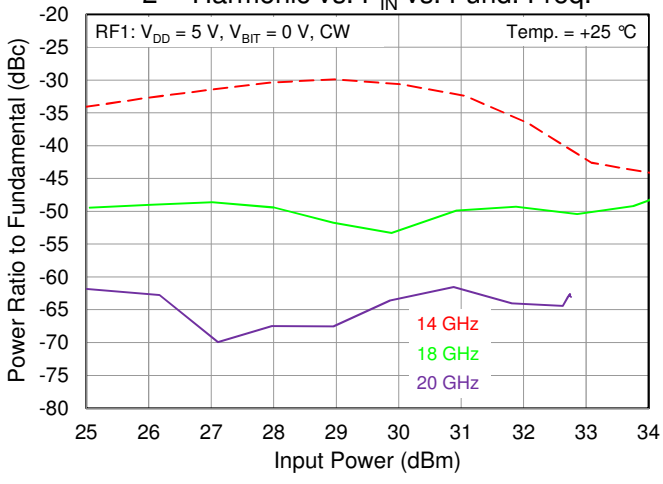
IM5 vs. P_{IN}/Tone vs. Temperature



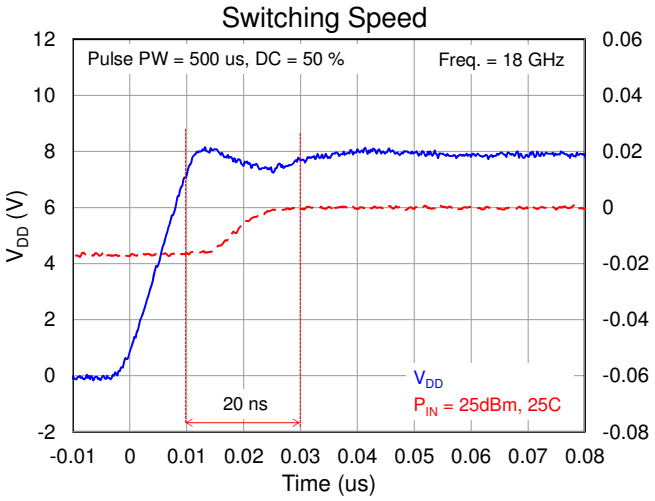
2^{ND} Harmonic vs. P_{IN} vs. Fund. Freq.

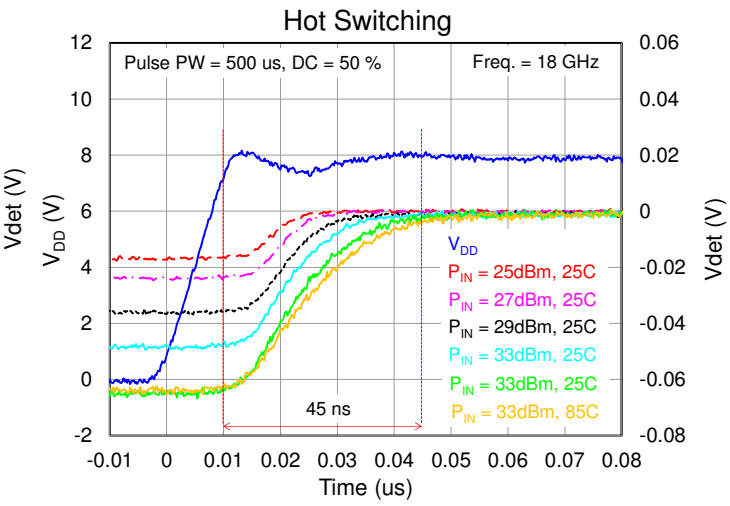


2^{ND} Harmonic vs. P_{IN} vs. Fund. Freq.

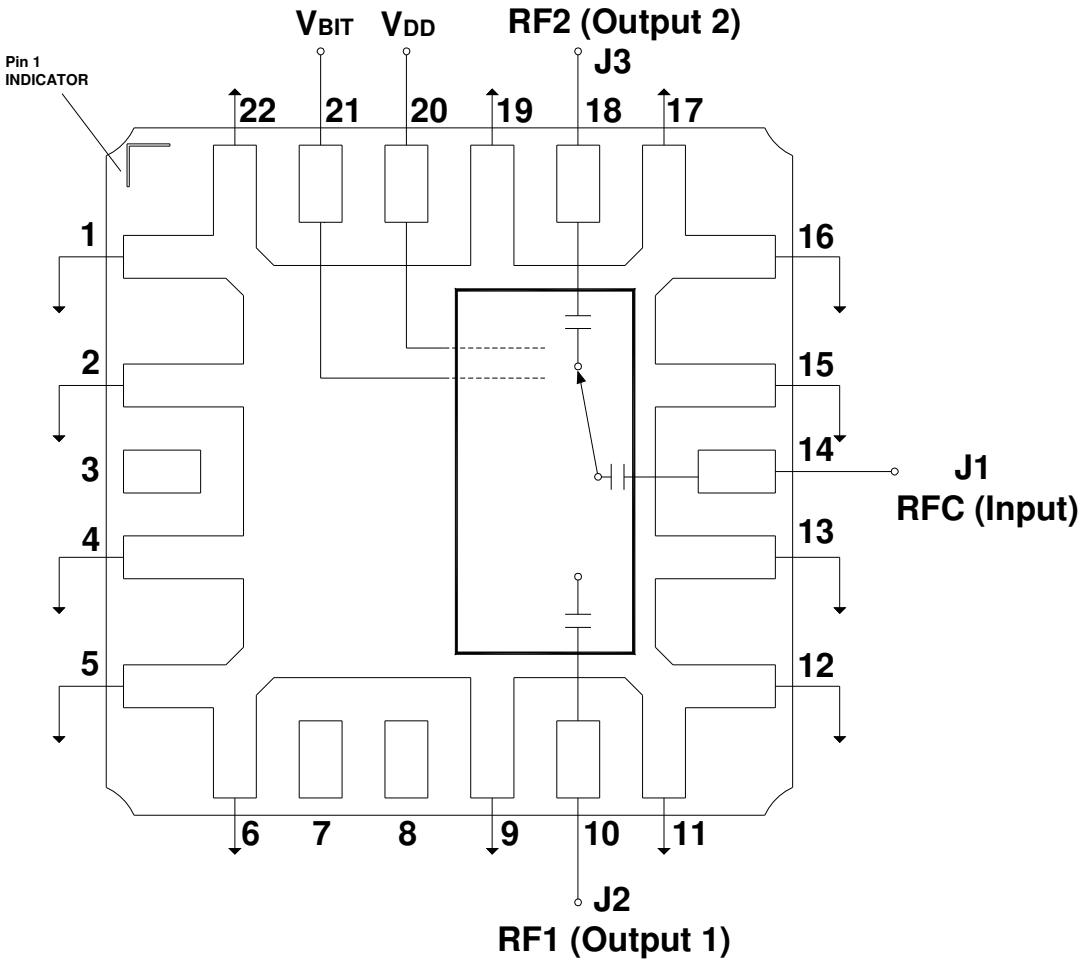


Typical Performance: Switching Speed





Applications Information

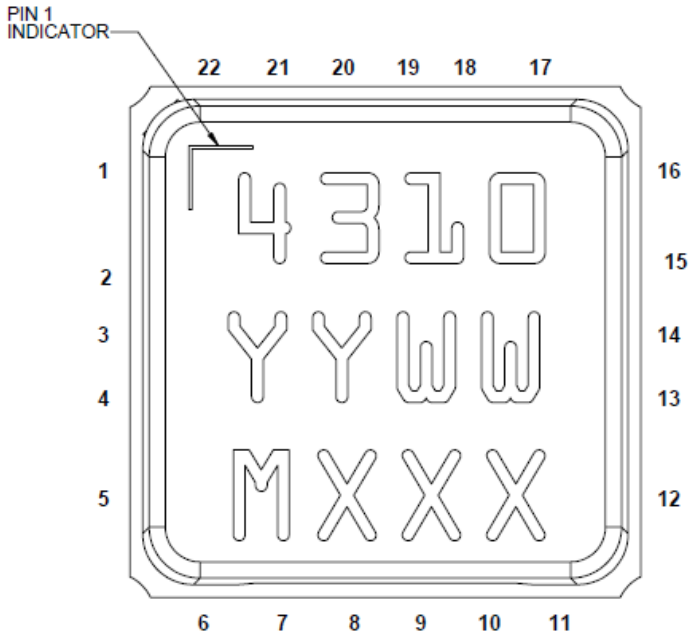


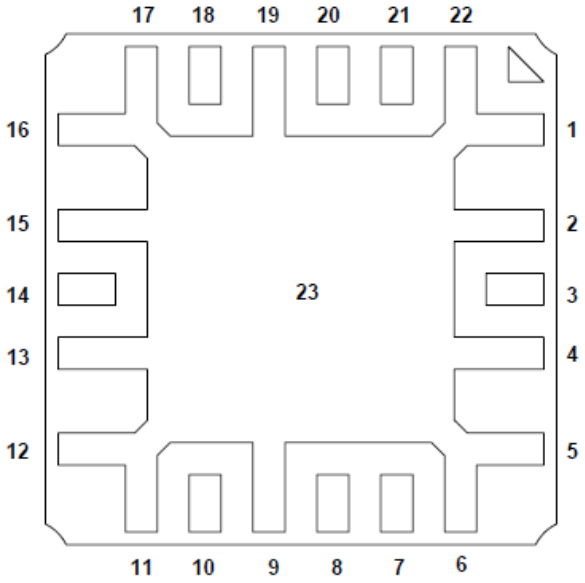
The switch can be configured as a Single Pole, Single Throw (SPST) by terminating one unused RF switched port (pin 10 or pin 18) with a 50 Ohm load.

Function Table

RF Path	State	V_{DD} (V)	V_{BIT} (V)
RFC (Input) to RF1 (Output1)	On-State (Insertion Loss)	5	0
	Off-State (Isolation)	5	5
RFC (Input) to RF2 (Output 2)	On-State (Insertion Loss)	5	5
	Off-State (Isolation)	5	0

Pin Layout

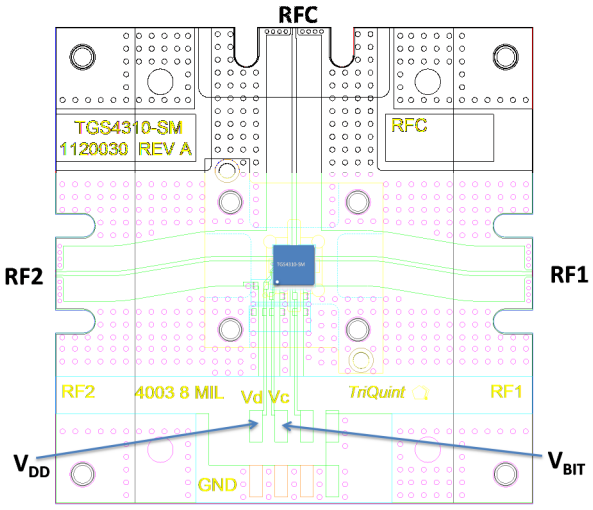




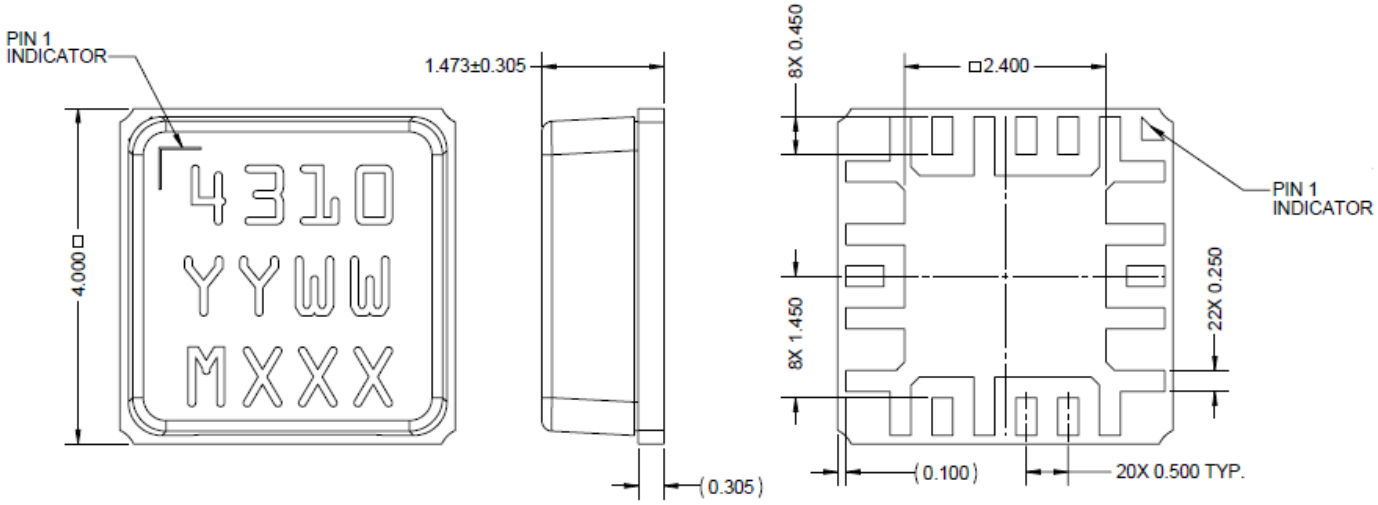
Pin Description

Pin No.	Symbol	Description
1, 2, 4, 5-6, 9, 11-13, 15-17, 19, 22	GND	Connected to ground paddle (pin 23); must be grounded on PCB
3, 7, 8	NC	No connection
10	RF1	Switched RF port 1 (Output 1); matched to 50 Ω; DC blocked
14	RFC	Common RF port (Input); matched to 50 Ω; DC blocked
18	RF2	Switched RF port 2 (Output 2); matched to 50 Ω; DC blocked
20	V_{DD} (or V_D)	Reference Voltage; no bias network required
21	V_{BIT} (or V_C)	Control Voltage; no bias network required
23	GND	Ground Paddle. Multiple vias should be employed to minimize inductance and thermal resistance.

Evaluation Board



Mechanical Information



Units: mm

Tolerances: unless specified

x.xx = ± 0.25

x.xxx = ± 0.127

Materials:

Base: Ceramic

Lid: Plastic

All metalized features are gold plated

Part is epoxy sealed

Marking:

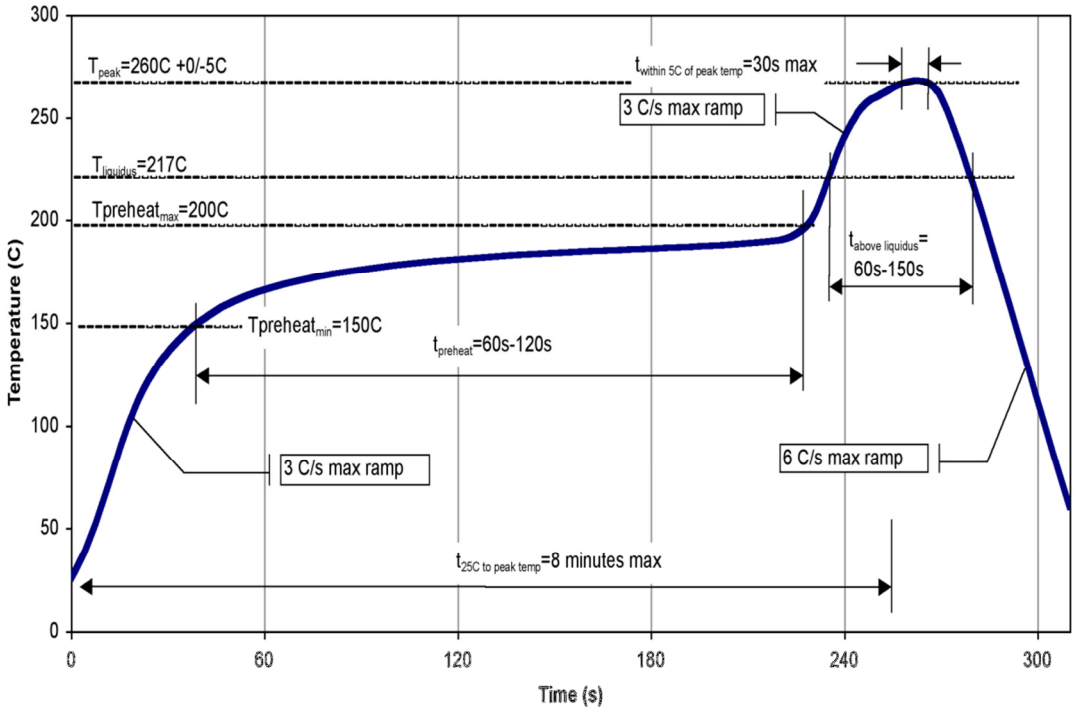
4310: Part number

YY: Part Assembly year

WW: Part Assembly week

MXXX: Batch ID

Recommended Soldering Temperature Profile



Product Compliance Information

ESD Sensitivity Ratings

Caution! ESD-Sensitive Device

ESD Rating: TBD
Value: TBD
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

MSL Rating

Level TBD at TBD°C convection reflow
The part is rated Moisture Sensitivity Level TBD at TBD°C per JEDEC standard IPC/JEDEC J-STD-020.

ECCN

US Department of Commerce: EAR99

Solderability

Compatible with the latest version of J-STD-020, Lead-free solder, 260°C

RoHS Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

Web: www.triquint.com **Tel:** +1.972.994.8465
Email: info-sales@triquint.com **Fax:** +1.972.994.8504

For technical questions and application information: **Email:** info-products@triquint.com

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OCEAN CHIPS
Океан Электроники
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Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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AVIC JONHON

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Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А