



Peregrine Semiconductor

Changing RF Design. Forever.™

2013
Commercial Products
Product Selection Guide
First Edition



Welcome to Peregrine Semiconductor

Peregrine Semiconductor (NASDAQ: PSMI) is a fabless provider of high-performance radio-frequency (RF) integrated circuits (ICs). Our solutions leverage our proprietary UltraCMOS® technology, which enables the design, manufacture, and integration of multiple RF, mixed-signal, and digital functions on a single chip. Our products deliver what we believe is an industry-leading combination of performance and monolithic integration, and target a broad range of applications in the aerospace and defense, broadband, industrial, mobile wireless device, test and measurement equipment, and wireless infrastructure markets.

We leverage our extensive RF design expertise and systems knowledge to develop RFIC solutions that address the stringent performance, integration, and reliability requirements of these rapidly evolving wireless markets. Additionally, because UltraCMOS devices are fabricated in standard high-volume CMOS facilities, products benefit from the fundamental reliability, cost effectiveness, high yields, scalability and integration of CMOS, while achieving the high performance levels historically expected from SiGe and GaAs. It is this combination of attributes which enables ease-of-development essential to timely and cost-effective application design by our customers.

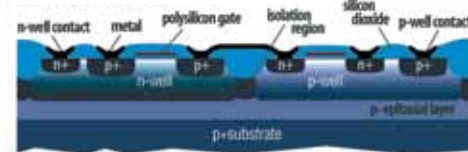
Peregrine's portfolio of high-performance RFICs includes switches, digital attenuators, frequency synthesizers, mixers/upconverters, prescalers, Digitally Tunable Capacitors (DTCs) and DC-DC converter products with power amplifiers on the horizon. Our products are sold through our direct sales and field applications engineering team and through our network of independent sales representatives and distribution partners around the world.



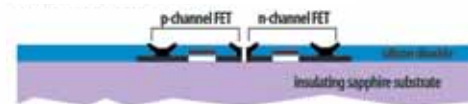
UltraCMOS® RF Process Technology

UltraCMOS technology combines the fundamental benefits of standard CMOS, the most widely used semiconductor process, with a highly insulating sapphire substrate. Distinctive generations of the UltraCMOS process are referred to in “STePs” – the most current release being STeP5 – each node delivering further design flexibility and improvements in RF performance. We also have engineered design advancements, including our patented HaRP™ technology which significantly improves harmonics and linearity, and our patent-pending DuNE™ technology, a circuit design technique used to develop our DTC products. We have protected our portfolio of intellectual property with numerous U.S. and international patents covering manufacturing processes, circuit elements and designs.

Bulk Silicon CMOS Process



UltraCMOS® Process



The UltraCMOS process, with its insulating sapphire substrate, simple and improved power handling, isolation and ESD tolerance.

Quality and Reliability

We are committed to providing high quality products and services that meet or exceed our customers' expectations. We have developed and implemented a quality management system to create an organizational environment designed to meet the highest level of quality and reliability standards. Our quality management system has been certified and maintained to ISO 9001 standards since 2001. We achieved AS9100 Quality Management System Standards certification in 2003 to address the strict quality system requirements of the aerospace industry. In early 2012, we further improved the robustness of our quality management system by receiving our ISO/TS 16949:2009 Quality Management System certification by the automotive industry.



Developing Complementary RF Products

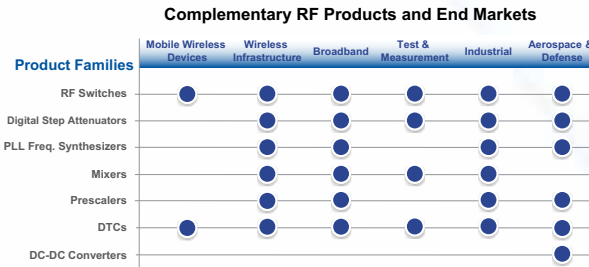
Peregrine's growing selection of products support a broad range of applications. Our technological innovations help maintain the competitive specifications and functionality of our products.

The Innovative HaRP™ Technology Invention

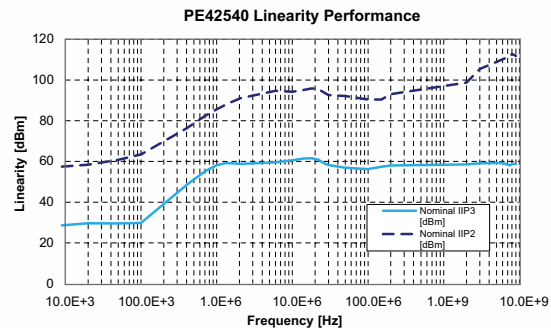
Peregrine's HaRP technology enhancements significantly improve harmonic and linearity performance in the RF front-end. Because UltraCMOS® technology is composed of a stack of field effect transistors manufactured on an insulating sapphire substrate, it has an inherent ability to pass high power RF signals. The HaRP invention allows for highly linear FETs which, when stacked together, deliver RF performance. In demanding applications such as RF test equipment, HaRP technology-enhanced ATE switches settle very quickly, reducing gate lag and insertion loss drift while maintaining high linearity and isolation over an extended frequency range. In high-power applications, HaRP technology-enhanced devices meet critical harmonics specifications with improved power handling. In addition, the HaRP-enabled high-throw, high-power switches for quad-band GSM and GSM/WCDMA handset applications have delivered a long-awaited breakthrough in Intermodulation Distortion (IMD) handling, a specification required by the 3GPP standards body for GSM/WCDMA applications.

DuNE™ Digital Tuning Technology

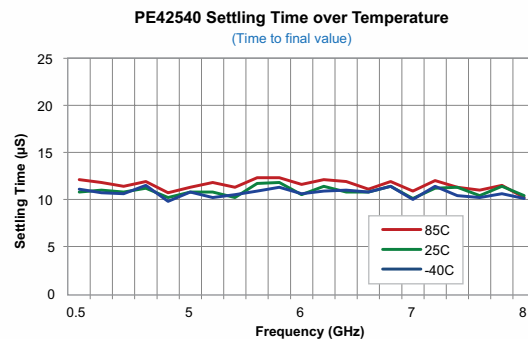
By applying our proven, patented UltraCMOS process and HaRP switch technologies, engineers at Peregrine developed DuNE™ tuning technology, a new circuit design technology used to develop Digitally Tunable Capacitors (DTCs). Supporting a wide range of tuning applications—from tuning the center frequency of mobile TV and cellular antennas to tunable impedance matching and filters—DuNE-enhanced products offer high power handling, excellent linearity and straightforward RF integration.



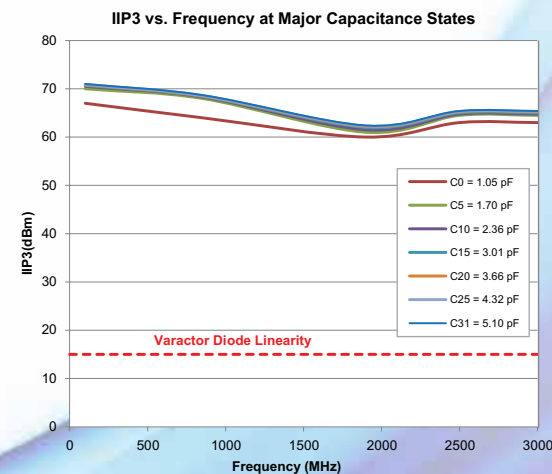
Peregrine's product families support a broad range of market segments



HaRP™ technology provides excellent linearity up to 7.5 GHz.



With tight specs over process and temperature, UltraCMOS RFICs will change the way you design.



DuNE™ DTCs offer excellent linearity compared to varactor diodes

Changing RF Design. Forever.™

Wireless and Broadband RF Products

RF Switches¹ - 50 Ω

Product Description	Part Number	Operating Frequency (MHz)	IIP3 (dBm @ 2 GHz)	P1dB ² (dBm @ 2 GHz)	Insertion Loss (dB @ 1 GHz)	Isolation (dB @ 1 GHz)	Typical Idd (μA @ 3V)	Vdd Range (V)	ESD HBM (V)	Package
SPST, Absorptive	PE4246	1-5000	53	33	0.80	55	33	2.7-3.3	200	6L 3x3 DFN
SPDT, Absorptive	PE4251	10-3000	59	30.5	0.60	62	55	3.0-3.6 ⁴	4000	8L MSOP (exposed)
SPDT, Absorptive	PE4257	5-3000	55	31 @ 1 GHz	0.75	64	8	2.7-3.3	1000	20L 4x4 QFN
SPDT, Absorptive	PE42552	9 kHz-7.5 GHz	65 @ 7.5 GHz	34 @ 7.5 GHz	0.65 @ 3 GHz	47 @ 3 GHz	15 @ 3.3V	3.0-3.6	1000	16L 3x3 QFN
SPDT, Absorptive	PE42556	9 kHz-13.5 GHz	56 @ 13.5 GHz	33 @ 13.5 GHz	0.92 @ 3 GHz	46	21.5 @ 3.3V	3.0-3.6	4000	Flip Chip
SPDT, Reflective	PE4210	10-3000	34	15	0.30	36	0.25	2.7-3.3	200	8L MSOP
SPDT, Reflective	PE4230	10-3000	55	32	0.35	39	29	2.7-3.3	250	8L MSOP
SPDT, Reflective	PE4237	10-4000	55	32	0.35	43	29	2.7-3.3	250	6L 3x3 DFN
SPDT, Reflective	PE4239	10-3000 ³	45	27	0.70	32	0.25	2.7-3.3	1500	6L SC70
SPDT, Reflective	PE4242	10-3000	45	27	0.70	32	0.25	2.7-3.3	1500	6L SC70
SPDT, Reflective	PE4244	10-3000 ³	45	26	0.60	39	0.25	2.7-3.3	1500	8L MSOP
SPDT, Reflective	PE4245	10-4000 ³	45	27	0.60	42	0.25	2.7-3.3	1500	6L 3x3 DFN
SPDT, Reflective	PE4250	10-3000	59	30.5	0.65	51	55	3.0-3.6 ⁴	4000	8L MSOP
SPDT, Reflective	PE4259	10-3000 ³	55	33.5 @ 1 GHz	0.35	30	9	1.8-3.3	2000	6L SC70
NEW SPDT, Absorptive	PE42420	100-6000	65	33	0.95	70	120	2.7-5.5	4000	20L 4x4 LGA
NEW SPDT, Reflective	PE42421	10-3000	55 @ 1 GHz	30.5	0.35	30	9	1.8-3.3	2000	6L SC70
NEW SPDT, Reflective	PE42422	100-6000	70	Note 7	0.25	44	120 @ 3.3V	2.3-5.5	4000	12L 2x2 QFN
SPDT, Reflective	PE42510A	30-2000	Note 5	Note 6	0.4	29	90 @ 3.3V	3.2-3.4	2000	32L 5x5 QFN
SPDT, Reflective	PE42551	9 kHz-6 GHz	50 @ 6 GHz	34 @ 6 GHz	0.65	29 @ 3 GHz	20 @ 2.75V	2.5-3.0	500	20L 4x4 QFN
SPDT, Reflective	PE4283	10-4000	57	32	0.65	33.5	8	2.0-3.3	1500	6L SC70
NEW SPDT, Reflective	PE42820	30-2600	Note 5	Note 6	0.4	29	130 @ 3.3V	2.7-5.5	2000	32L 5x5 QFN
NEW SPDT, Reflective	PE42821	100-2600	Note 5	Note 6	0.4	29	130 @ 3.3V	2.7-5.5	2000	32L 5x5 QFN
NEW SPDT, Reflective	PE42359	10-3000	54 @ 2.5 GHz	33.5 @ 1 GHz	0.35	29	9	1.8-3.3	2000	6L SC70
SP3T, Reflective	PE42430	100-3000	66	30	0.45	40	130	3.0-5.5	4500	8L 1.5x1.5 DFN
SP3T, Reflective	PE42650A	30-1000	Note 5	Note 6	0.3	38	90	3.2-3.4	2000	32L 5x5 QFN
NEW SP4T, Absorptive	PE42540	10 Hz-8 GHz	58 @ 8 GHz	33 @ 8 GHz	0.8 @ 3 GHz	45 @ 3 GHz	90 @ 3.3V	3.0-3.6	1000	32L 5x5 LGA
SP4T, Reflective	PE42440	50-3000	67	41.5	0.45	34	13	2.7-3.0	2000	16L 3x3 QFN
SP5T, Absorptive	PE42451	450-4000	58	35	1.65	62	14	2.7-3.3	3500	24L 4x4 QFN
NEW SP5T, Reflective	PE42850	30-1000	Note 5	Note 6	0.4	29	130 @ 3.3V	2.7-5.5	2000	32L 5x5 QFN
NEW SP5T, Reflective	PE42851	100-1000	Note 5	Note 6	0.4	29	130 @ 3.3V	2.7-5.5	2000	32L 5x5 QFN
SP6T, Reflective	PE4268	100-3000	40	20	0.60	50	13	2.4-2.8	1500	20L 4x4 QFN
NEW Dual Diff SPDT	PE42920	10 kHz-6 GHz	44	13 (differential)	1.0	30 @ 6 GHz	100 @ 3.3V	3-3.35	2000	16L 3x3 QFN
NEW Dual Diff SPDT	PE42924	10 kHz-6 GHz	44	13 (differential)	1.0	30 @ 6 GHz	100 @ 3.3V	3-3.35	2000	16L 3x3 QFN

Note 1: To view S-parameter data for 50 Ω switches, visit the product section of our website at: www.psemi.com

Note 2: Power handling varies over frequency. See datasheet

Note 3: Can be used in a 75 Ω environment

Note 4: Idd range of 4.5-5.5V also available

Note 5: Contact Peregrine's application support team for more information

Note 6: PE42510A, PE42650A, PE42820, PE42821, PE42850 and PE42851 High Power Switches: P0.1dB = 45.4 dBm @ 0.8 GHz

Note 7: P0.1dB = 34 dBm @ 2 GHz



UltraCMOS[®] RFICs deliver extraordinary
ESD tolerance – up to 4.5kV HBM

Test Equipment/ATE Switches

Peregrine offers complementary devices for TE/ATE applications. HaRP™ technology enhancements reduce gate lag and insertion loss drift while maintaining high linearity and isolation over an extended frequency range of 9 kHz-13.5 GHz, with the new PE42540 switch offering low-frequency performance down to 10 Hz.

Test Equipment/ATE Switches - 50 Ω

Product Description	Part Number ¹	Operating Frequency	IIP3 / P1dB (dBm)	Insertion Loss (dB @ 3 GHz)	Isolation (dB @ 1 GHz)	Typical Idd (μA @ 3.3V)	Vdd Range (V)	ESD HBM (V)	Package
SPDT, Reflective	PE42551	9 kHz-6 GHz	50 / 34 @ 6 GHz	0.65	29 @ 3 GHz	20 @ 2.75V	2.5-3.0	500	20L 4x4 QFN
SPDT, Absorptive	PE42552	9 kHz-7.5 GHz	65 / 34.5 @ 7.5 GHz	0.65	47	15	3.0-3.6	1000	16L 3x3 QFN
SPDT, Absorptive	PE42556	9 kHz-13.5 GHz	56 / 33 @ 13.5 GHz	0.92	46	21.5	3.0-3.6	4000	Flip Chip
NEW SP4T, Absorptive	PE42540	10 Hz-8.0 GHz	58 / 33 @ 8.0 GHz	0.80	45 @ 3 GHz	90	3.0-3.6	1000	32L 5x5 LGA

Note 1: See also the PE43703 Digital Step Attenuator for TE/ATE designs on page 5

UltraCMOS® performs down to 10 Hz and up to 13.5 GHz!

High-Power RF Switches

Peregrine's high-power switch products deliver a 50W P1dB compression point with high linearity, efficient power handling capabilities, and harmonic performance of less than -84 dBc @ 42.5 dBm.

High Power RF Switches - 50 Ω

Product Description	Part Number	Operating Frequency (MHz)	P0.1dB (dBm @ 0.8 GHz)	Insertion Loss (dB @ 1 GHz)	Isolation (dB @ 1 GHz)	Typical Idd (μA @ 3.3V)	Vdd Range (V)	ESD HBM (V)	Package
SPDT, Reflective	PE42510A ¹	30-2000	45.4	0.4	29	90	3.2-3.4	2000	32L 5x5 QFN
NEW SPDT, Reflective	PE42820	30-2600	45.4	0.4	29	130	2.7-5.5	2000	32L 5x5 QFN
NEW SPDT, Reflective	PE42821	100-2600	45.4	0.4	29	130	2.7-5.5	2000	32L 5x5 QFN
SP3T, Reflective	PE42650A ¹	30-1000	45.4	0.3	38	90	3.2-3.4	2000	32L 5x5 QFN
NEW SP5T, Reflective	PE42850	30-1000	45.4	0.4	29	130	2.7-5.5	2000	32L 5x5 QFN
NEW SP5T, Reflective	PE42851	100-1000	45.4	0.4	29	130	2.7-5.5	2000	32L 5x5 QFN

Note 1: Market restrictions apply

Automotive AEC-Q100 Certified Switches

Peregrine's first automotive RF switch is AEC-Q100 Grade 2 certified and capable of supporting operating temperatures up to +105°C.

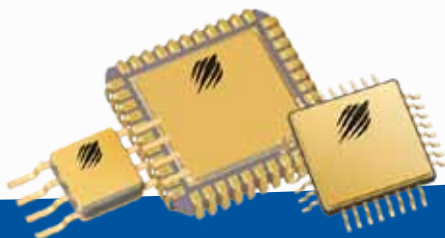
Automotive AEC-Q100 Certified Switches - 50 Ω

Product Description	Part Number	Operating Frequency (MHz)	P1dB (dBm @ 1 GHz)	Insertion Loss (dB @ 1 GHz)	Isolation (dB @ 1 GHz)	Typical Idd (μA @ 3.3V)	Vdd Range (V)	ESD HBM (V)	Package
NEW SPDT, Reflective	PE42359	10-3000	33.5	0.35	29	9	1.8-3.3	2000	6L SC70

High-Reliability Products

Peregrine Semiconductor's UltraCMOS® Silicon-on-Sapphire (SOS) technology has achieved significant performance milestones in reliability and RF performance, making them well suited for demanding High-Reliability (Hi-Rel) designs. UltraCMOS products are designed to meet stringent low-power requirements of telecom, infrastructure, microwave and VSAT military radios, radar and ECM space systems, and test instrumentation applications. All Hi-Rel devices are available in ceramic hermetic packaging and in die form. Screening is available for commercial space designs.

Scan the QR code to learn more about Peregrine's High-Reliability products.



Wireless and Broadband RF Products (continued)

Broadband Switches¹ - 75 Ω

Product Description	Part Number	Operating Frequency (MHz)	IIP2 ² (dBm)	CTB ³ (dBc)	P1dB ⁴ (dBm)	Insertion Loss (dB @ 1 GHz)	Isolation (dB @ 50 MHz)	Isolation (dB @ 1 GHz)	Typical I _{dd} (μA @ 3V)	ESD HBM (V)	Package
SPST, Absorptive	PE4270	1-3000	80	-90	30	0.75	90	63	8	500	6L 3x3 DFN
SPST, Absorptive	PE4271	1-3000	80	-90	33	0.80	85	60	8	500	6L 3x3 DFN
SPDT, Absorptive	PE4256	5-3000	80	-90	31	0.90	80	65	8	1000	20L 4x4 QFN
SPDT, Absorptive	PE4280	5-2200	75	-85	26	1.10	72	60	8	1000	20L 4x4 QFN
SPDT, Reflective	PE4231	1-1300	80	-90	32	0.80	75	42	29	200	8L MSOP
SPDT, Reflective	PE4272	5-3000	80	-90	32	0.50	70	43	8	1500	8L MSOP
SPDT, Reflective	PE4273	5-3000	80	-90	32	0.50	63	34.5	8	1500	6L SC70

Broadband Switches¹ - 75 Ω - with Unpowered Operation

Product Description	Part Number	Operating Frequency (MHz)	IIP2 ² (dBm)	P1dB ⁴ pwr/unpwr (dBm)	Insertion Loss pwr (dB @ 0.8 GHz)	Isolation pwr/unpwr (dB @ 50 MHz)	Isolation pwr/unpwr (dB @ 0.8 GHz)	Typical I _{dd} (μA @ 3V)	ESD HBM (V)	Package
SPDT, Absorptive	PE42742	5-2200	90	32/26.5	0.7	94/90.5	75/77	8	3500	20L 4x4 QFN
SPDT, Absorptive	PE42750	5-2200	100	23.5	1.0	86/87	72/79	8	2000	12L 3x3 QFN

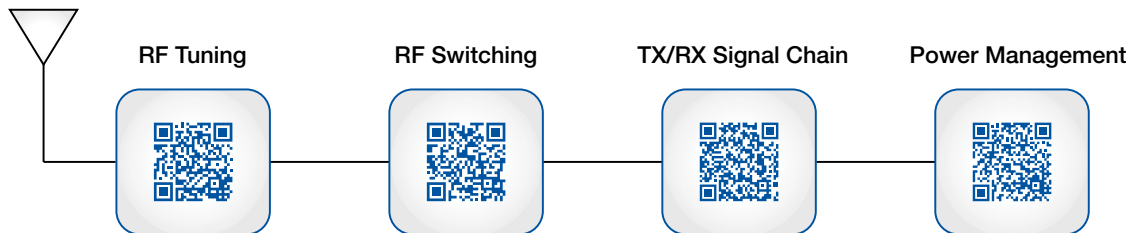
Note 1: V_{dd} Range for 75 Ω Broadband Switches = 2.7-3.3V
Note 2: Measurement is limited by test equipment

Note 3: CTB/CSO measured with 77 and 110 channels; PO = 44 dBmV
Note 4: Measured at 1 GHz

RF Signal Chain Solutions

Monolithic integration, or the ability to integrate multiple RF, analog and digital functions on a single IC, is a fundamental benefit of UltraCMOS[®] technology and vital to engineering a solid RF signal chain solution. UltraCMOS RFICs offer excellent linearity and isolation, market-leading harmonics and robust ESD tolerance, making them well suited for RF Tuning, RF Switching, RF/IF Transmit/Receive, and Power Management in a variety of mixed signal applications.

Find out more...scan one of the Quick Response (QR) codes below and spend some time browsing our new online RF Design Centers, each dedicated to solving the toughest challenges throughout the RF signal chain.



*Need a QR Reader for your smart phone?
 Visit your service provider or search the web
 for the application best suited for your device.*



RF Digital Step Attenuators (Monolithic) - 50 Ω

Product Description Part Number	Attenuation	Programming Mode	Operating Freq. (MHz)	Insertion Loss (dB)	Input IP3 (dBm)	Attenuation Accuracy (dB @ 1 GHz)	Switching Speed (μs)	ESD HBM (V)	Package
2-bit - PE43204	18 range / 6, 12 dB steps	Parallel	50-3000	0.6	61	-0.25 / +0.40	0.03	2000	12L 3x3 QFN
5-bit - PE4305	15.5 range / 0.5 dB steps	Parallel ¹ , Serial	1-4000	1.5	52	±(0.25+3% of setting)	1	500	20L 4x4 QFN
5-bit - PE4306	31 range / 1.0 dB steps	Parallel ¹ , Serial	1-4000	1.5	52	±(0.30+3% of setting)	1	500	20L 4x4 QFN
5-bit - PE43501	7.75 range / 0.25 dB steps	Parallel ¹ , Ser-Add. ²	20-6000	2.3	58	±(0.15+4% of setting)	0.65	500	32L 5x5 QFN
5-bit - PE43502	15.5 range / 0.5 dB steps	Parallel ¹ , Serial	20-6000	2.4	58	±(0.3+3% of setting)	0.65	500	24L 4x4 QFN
5-bit - PE43503	31 range / 1 dB steps	Parallel ¹ , Serial	20-6000	2.4	58	±(0.3+3% of setting)	0.65	500	24L 4x4 QFN
6-bit - PE4302	31.5 range / 0.5 dB steps	Parallel ¹ , Serial	1-4000	1.5	52	±(0.10+3% of setting)	1	500	20L 4x4 QFN
6-bit - PE4309	31.5 range / 0.5 dB steps	Parallel	5-4000	1.6	52	±(0.10+3% of setting)	1	2000	24L 4x4 QFN, DIE
6-bit - PE43601	15.75 range / 0.25 dB steps	Parallel ¹ , Ser-Add. ²	20-6000	2.3	57	±(0.2+4% of setting)	0.65	500	32L 5x5 QFN
6-bit - PE43602	31.5 range / 0.5 dB steps	Parallel ¹ , Serial	20-5000	2.2	58	±(0.3+3% of setting)	0.65	500	24L 4x4 QFN
7-bit - PE43701	31.75 range / 0.25 dB steps	Parallel ¹ , Ser-Add. ²	20-4000	1.9	59	±(0.2+1.5% of setting)	0.65	500	32L 5x5 QFN
7-bit - PE43702	31.75 range / 0.25 dB steps	Parallel ¹ , Serial	20-4000	2.0	57	±(0.2+3% of setting)	0.65	500	24L 4x4 QFN
7-bit - PE43703	31.75 / 0.25, 0.5, 1.0 steps	Parallel ¹ , Ser-Add. ²	9kHz-6GHz	1.9	59	±(0.2+1.5% of setting)	0.65	500	32L 5x5 QFN
NEW 7-bit - PE43704	31.75 / 0.25, 0.5, 1.0 steps	Parallel ¹ , Ser-Add. ²	9kHz-6GHz	1.9	59	±(0.2+1.5% of setting)	0.65	1000	32L 5x5 QFN

Note 1: Parallel Modes: Latched and Direct

Note 2: Serial-Addressable Mode

Broadband Digital Step Attenuators (Monolithic) - 75 Ω

Product Description Part Number	Attenuation	Programming Mode	Operating Freq. (MHz)	Insertion Loss (dB)	Input IP3 (dBm)	Attenuation Accuracy (1 GHz)	Switching Speed (μs)	ESD HBM (V)	Package
4-bit - PE43404	15 range / 1.0 steps	Parallel ¹ , Serial	1-2000	1.4	52	±(0.25+7% of setting)	1	500	20L 4x4 QFN
5-bit - PE4307	15.5 range / 0.5 steps	Parallel ¹ , Serial	1-2000	1.4	52	±(0.15+4% of setting)	1	500	20L 4x4 QFN
5-bit - PE4308	31 range / 1.0 steps	Parallel ¹ , Serial	1-2000	1.4	52	±(0.20+4% of setting)	1	500	20L 4x4 QFN
6-bit - PE4304	31.5 range / 0.5 steps	Parallel ¹ , Serial	1-2000	1.4	52	±(0.15+4% of setting)	1	500	20L 4x4 QFN

Note 1: Parallel Modes: Latched and Direct

Phase Locked-Loop (PLL) Frequency Synthesizers¹

Part Number	Φ Det Type	Programming Mode	Max Input Operating Freq.				Main Counters M, A	Reference Counters	Typical I _{dd} (mA @ 3V)	ESD HBM (V)	Package
			(GHz) RF PLL	(MHz) Ref.	(MHz) Compare	Prescaler					
PE3336	PD	Parallel, Serial, Hardware	3	100	20	10/11	9bit, 4bit	6bit	19	1000	48L 7x7 QFN
PE3341	CP	Serial, EEPROM ²	2.7 ³	100	20	10/11	9bit, 4bit	6bit	20	1000	20L 4x4 QFN
PE3342	PD	Serial, EEPROM ²	2.7 ³	100	20	10/11	9bit, 4bit	6bit	20	1000	20L 4x4 QFN
NEW PE33241	PD	Parallel, Serial, Hardware	4	100	100	5/6 or 10/11	9bit, 4bit	6bit	45 @ 2.5V	1000	48L 7x7 QFN
PE83336 ⁴	PD	Parallel, Serial, Hardware	3	100	20	10/11	9bit, 4bit	6bit	20	1000	44L CQFJ

Note 1: V_{dd} Range = 2.85-3.15V

Note 2: Programming Kit available-contains 10 samples

Note 3: 3 GHz available. See datasheet

Note 4: Not available for Space Level Screening

MOSFET Quad Array Mixer Core¹

Part Number	Operating Frequency (MHz)		IF, Nom.	LO Drive (dBm)	Conv. Loss (dB)	Isolation (dB, typ.)		Input IP3 (dBm, typ.)	ESD HBM (V)	Package
	LO	RF				LO-RF	LO-IF			
PE4140 ²	0.01-6000	0.01-6000	0.01-6000	0-20	6.5-7.5	25-40	25-40	36	100	6L 3x3 DFN, DIE
PE4141 ²	0.01-1000	0.01-1000	0.01-1000	0-20	7.0-8.0	40	40	33	100	8L MSOP
PE4150 ³	245.65-885.65	136-941	44.85-109.65	-10 to -6	6.5-8.7	30	30	25	1000	20L 4x4 QFN

Note 1: Fully differential DC coupled ports. External baluns required

Note 2: MOSFET Quad Array

Note 3: Buffered Quad FET Array

Prescalers

Part Number Product Description	Input Operating Frequency (MHz)	Divide Ratio	Typical I _{dd} (mA @ 3V)	V _{dd} Range (V)	ESD HBM (V)	Package
PE3511 - Divide-by-2	DC-1500	2	8	2.85-3.15	2000	6L SC70
PE3512 - Divide-by-4	DC-1500	4	8	2.85-3.15	2000	6L SC70
PE3513 - Divide-by-8	DC-1500	8	8	2.85-3.15	2000	6L SC70

Wireless and Broadband RF Products (continued)

Mobile Wireless Switches

Peregrine's high-performance mobile wireless switches offer a different approach to solving the toughest high-power, multi-throw switching challenges.

Mobile Wireless Switches - 50 Ω												
Product Description	Part Number ¹	2nd Harmonic (dBc)		3rd Harmonic (dBc)		Insertion Loss (dB @ 1 GHz)	Isolation (dB @ 1 GHz)	IMD3 (dBm)	Typical I _{dd} (μA @ 2.75V)	V _{dd} Range (V)	Package	
		35 dBm TX Input 850/900 MHz	33 dBm TX Input 1800/1900 MHz	35 dBm TX Input 850/900 MHz	33 dBm TX Input 1800/1900 MHz							
SP4T - 2Tx/2Rx	PE42612 ²	-82	-89	-74	-68	0.55	39	-	11	2.4-2.95	Flip Chip	
SP6T - 2Tx/4Rx	PE42632 ²	-87	-86	-78	-76	0.65	38	-	13	2.5-2.8	Flip Chip	
SP6T - 6Tx	PE42662 ²	-75	-73	-75	-73	0.50	38	-111	120	2.4-3.0	Flip Chip	
SP7T - 3Tx/4Rx	PE42674 ²	-85	-84	-79	-76	0.65	39	-112	13	2.5-3.2	Flip Chip	
SP9T - 2Tx/3TRx/4Rx	PE42695	-77	-75	-77	-75	0.45	38	-111	115	2.4-3.0	Flip Chip	
SP6T - 2Tx/4Rx	PE42660	-85	-84	-83	-82	0.55	48	-	13	2.65-2.85	DIE	
SP7T - 2Tx/2TRx/3Rx	PE42671 ²	-83	-82	-77.5	-78	0.65	46	-111	13	2.65-2.85	DIE	
SP7T - 3Tx/4Rx	PE42672 ²	-85	-84	-79	-77	0.60	44	-109	13	2.65-2.85	DIE	
SP4T - 4RF	PE42641 ²	-86	-87	-81	-80	0.45	35	-110	13	2.65-2.85	16L 3x3 QFN	

Note 1: Operating Frequency 100-3000 MHz

Note 2: 1.8V-compliant logic (VIH/VIL = 1.4/0.4V)

Peregrine's new STeP5 mobile wireless switches meet or exceed the following market performance specifications.

Please contact Peregrine Semiconductor at sales@psemi.com to help determine which switch is best for your application.

STeP5 Mobile Wireless Switches - 50 Ω												
Product Description	Part Number ¹	Interface	2nd Harmonic (dBm)		3rd Harmonic (dBm)		Insertion Loss (dB @ 1 GHz)	Isolation (dB @ 1 GHz)	IMD3 (dBm)	Typical I _{dd} (μA @ 2.75V)	Package	
			35 dBm TX Input 850/900 MHz	33 dBm TX Input 1800/1900 MHz	35 dBm TX Input 850/900 MHz	33 dBm TX Input 1800/1900 MHz						
NEW SP8T - 8Tx	PE426821	GPIO	-42	-42	-42	-42	0.35	38	-111	120	Flip Chip	
NEW SP8T - 8Tx	PE426851	MIPI	-42	-42	-42	-42	0.35	38	-111	120	Flip Chip	
NEW SP10T - 8Tx/2Rx	PE426151	GPIO	-42	-42	-42	-42	0.40	38	-111	120 ²	Flip Chip	
NEW SP10T - 8Tx/2Rx	PE426152	GPIO	-42	-42	-42	-42	0.40	38	-111	120 ²	Flip Chip	
NEW SP10T - 8Tx/2Rx	PE426153	GPIO	-42	-42	-42	-42	0.40	38	-111	120 ²	Flip Chip	
NEW SP10T - 10Tx	PE426161	MIPI	-42	-42	-42	-42	0.20 ³	38	-111	120	Flip Chip	
NEW SP12T - 12Tx	PE426171	MIPI	-42	-42	-42	-42	0.35	38	-111	120	Flip Chip	

Note 1: Operating Frequency: 100-3000 MHz, V_{dd} Range: 2.3-1.8V

Note 2: Typical I_{dd} @ 3.6V

Note 3: Super TX ports only; 0.35 on other TX ports

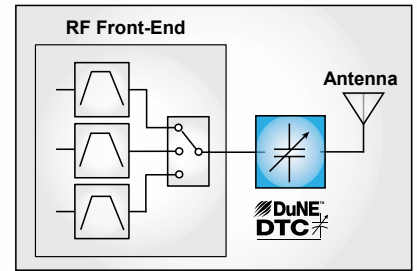
Scan the QR code to visit psemi.com.



DuNE™ Digitally Tunable Capacitors (DTCs)

In complex radio designs where detuning can cause increased filter loss, PA inefficiencies and antenna mismatch, signal-chain performance can be significantly improved with a monolithically integrated solid-state impedance tuning solution.

Peregrine's DTCs continue in a tradition of innovation, high performance and ease-of-use by offering tunability, high voltage handling and excellent linearity.



DuNE™ Digitally Tunable Capacitors

Part Number	Interface	Min Capacitance (pF)		Max Capacitance (pF)		Tuning Ratio		Quality Factor (Shunt, 1 GHz)		ESD HBM (V)	Package
		Series	Shunt	Series	Shunt	Series	Shunt	Cmin	Cmax		
PE64101 ¹	SPI Compatible	Note 2	1.4	Note 2	5.9	Note 2	4.3:1	45	12	1500	12L 2x2 QFN
PE64102 ¹	SPI Compatible	Note 2	1.9	Note 2	14	Note 2	7.4:1	45	12	1500	12L 2x2 QFN
PE64904 ¹	SPI Compatible	0.60	1.10	4.60	5.10	7.7:1	4.6:1	35	25	1500	10L 2x2 QFN
PE64905 ¹	I ² C Compatible	0.60	1.10	4.60	5.10	7.7:1	4.6:1	35	25	2000	10L 2x2 QFN

Note 1: Operating Frequency: 100-3000 MHz, V_{dd} Range: 2.3-3.6V

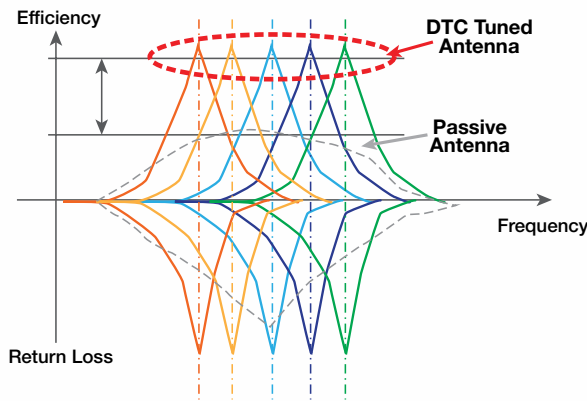
Note 2: For series configuration see equivalent circuit model in datasheet

DTC Application Examples

From tunable filters and matching networks, RFID/NFC, HF/VHF/UHF radios and directional antennas, to phase shifters, antenna tuning and other wireless communications, Peregrine DTCs meet the needs of today's applications, helping to reduce design size and complexity while improving performance.

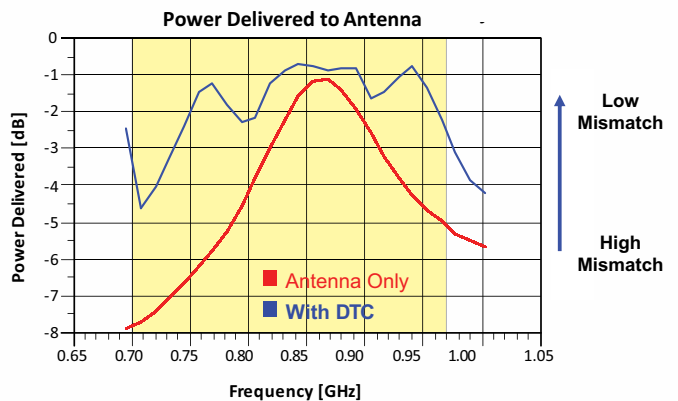
Antenna Band Switching

Antenna element length is adjusted dynamically to tune the resonant frequency.



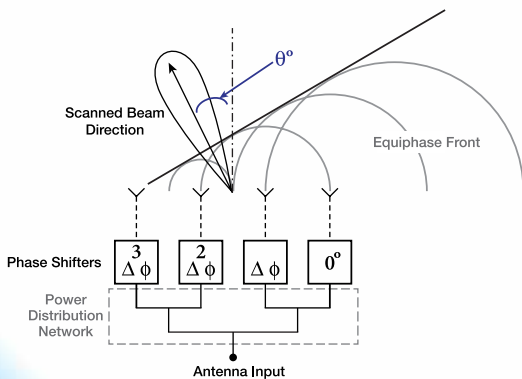
Antenna Impedance Matching

The DTC tuner increases power delivered to the antenna by eliminating mismatch loss.



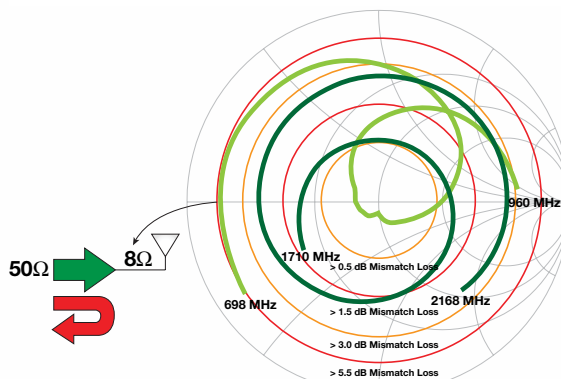
Phase Shifter

Phase shifters enable antenna beam steering.



Tunable Matching Networks

Match the desired impedance to 50 Ω or other impedance over broadband (700-2200 MHz) to minimize mismatch loss.



Simply Designed. Simply Green. Only UltraCMOS®



For years, IC and process designers have been interested in UltraCMOS® Silicon-on-Sapphire (SOS) technology as a high-performance alternative to high-voltage RF processes such as SiGe and GaAs.

Today, engineers around the world benefit from not only the performance advantages, but also the fundamental properties of UltraCMOS which make it an **environmentally friendly** option.

Leave a Smaller Footprint...And Less eWaste

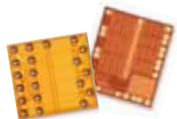
Adding to the potential environmental advantages, UltraCMOS technology enables high levels of monolithic integration, resulting in smaller die and fewer external components in the design.

Go Green...Not Toxic

As semiconductor processing materials and eWaste are scrutinized by governments and industries around the globe, growing concern over the toxicity and carcinogenic nature of GaAs, along with its associated arsenic slurries, continues to drive market leaders toward more eco-friendly technology solutions.

Low Power Consumption

Low parasitic advantages of standard Silicon-on-Insulator (SOI) are strengthened with the UltraCMOS process, which delivers minimum parasitic capacitance and industry leading dispersion. When compared to the high-voltage RF processes, UltraCMOS devices consume less power.



Wire-bond Die and Flip Chip

Going Green Starts on the Inside

The UltraCMOS process, a high-performance variation of SOI process, is not based on arsenic (as are all GaAs-based devices) but instead incorporates a sapphire substrate, which intrinsically offers both environmental as well as RF benefits. See Peregrine's Green Package Information sheet and Certificate of Conformance on psemi.com to learn more.

RoHS-Compliant Commercial Packaging Options

Peregrine is proud to offer RoHS-compliant, lead-free (Pb-free) packaging for its UltraCMOS RFICs. Pb-free packages utilize matte tin (Sn) plating, or for select QFN packages NiPdAu plating, on to copper lead frames. The reliability aspects of matte Sn plating have been well-researched, including solderability with both Pb-free and standard SnPb solders, and whisker growth in accelerated temperature/humidity conditions. NiPdAu plating provides a solderable surface for both eutectic and Pb-free solders, is less

susceptible to oxidation, and provides long-term storage and solderability.

As regulatory conditions change and new Pb-free packaging solutions become available, Peregrine will maintain its commitment to doing its part to preserve our environment. If the Pb-free solution that you require is not shown, please consult with Peregrine or any of its worldwide sales representatives for solutions to your specific need.



6L SC70
1.3 x 2.0 x 1.0



8L 1.5x1.5 DFN
1.5 x 1.5 x 0.50



10L 2x2 QFN
2.0 x 2.0 x 0.45



12L 2x2 QFN
2.0 x 2.0 x 0.60



8L MSOP
3.0 x 3.0 x 1.1
Regular and exposed
ground paddle



6L DFN
3.0 x 3.0 x 0.9
Fused and Isolated
versions



12L 3x3 QFN
3.0 x 3.0 x 0.75



16L 3x3 QFN
3.0 x 3.0 x 0.75



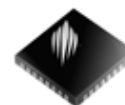
20L 4x4 LGA
4.0 x 4.0 x 0.9



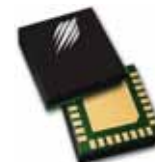
20L 4x4 QFN
4.0 x 4.0 x 0.9



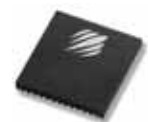
24L 4x4 QFN
4.0 x 4.0 x 0.9



32L 5x5 QFN
5.0 x 5.0 x 0.9



32L 5x5 LGA
5.0 x 5.0 x 0.9



48L QFN
7.0 x 7.0 x 0.9

All dimensions are listed in millimeters (width x length x height) and are approximate. See product datasheets for exact dimensions.

Design and Application Support

Designing for tomorrow's challenging RF applications requires great products and great technical support. From our engineering excellence, to streamlined manufacturing and technical sales and applications support, Peregrine Semiconductor is committed

to providing a complete product solution. Choose among our comprehensive library of datasheets, application notes, tutorials, reference designs and other engineering resources, all developed to help get your design to market on time.

Online Applications Support Materials

Product Documentation: Reference libraries show all documentation available for each product.

Application Notes: Use our application notes to help design for tomorrow's challenging RF applications.

Datasheet Library: Links to all datasheets, organized by part type and part number.

Package Information: Shows package dimensions and includes material listing for each package.

Technical FAQs: Search our Frequently Asked Questions database.

Contact Apps Support: Submit a help ticket to our Applications Engineering team.

Application Notes

AN10	Connecting the PE3336, PE9601, and PE9701 to a Serial Bus Interface*	AN24	Migrating from PE9763 to PE97632*
AN12	Considerations for Using the PE323x/PE333x in Fractional-N or Sigma-Delta Designs	AN26	Advantages of UltraCMOS® DSAs with Serial-Addressability
AN15	Impedance Matching the PE4210/20/30 RF Switches for 75 Ω Applications	AN27	Using Blocking Capacitors with UltraCMOS® Devices
AN16	Using Peregrine PLL in System Clock Applications	AN28	Using the DTC with I ² C Operation
AN17	OC-12 622.08 MHz Reference Clock Design	AN29	DTC Theory of Operation
AN18	RF Switch Performance Advantages of UltraCMOS® Technology over GaAs Technology	AN31	MIPI RFFE Control of UltraCMOS® Devices
AN20	Multi-Port Handset Switch S-Parameters	AN32	Radiation-Hardened Power Management Solution for Xilinx Virtex-5 Space-Grade FPGAs*
AN22	Migrating from PE9702 to PE97022*	AN33	5-bit and 6-bit RF Digital Step Attenuator Compatibility
AN23	Migrating from PE9704 to PE97042*	AN34	Implementing Design Features of the PE9915x Point-of-Load Buck Regulator*

*More information on these products can be found in the High-Reliability Product Selection Guide.

Online Support System – support.psemi.com

Visit our website to find the technical resource you need.



Product Documentation



Knowledge Base
and FAQs

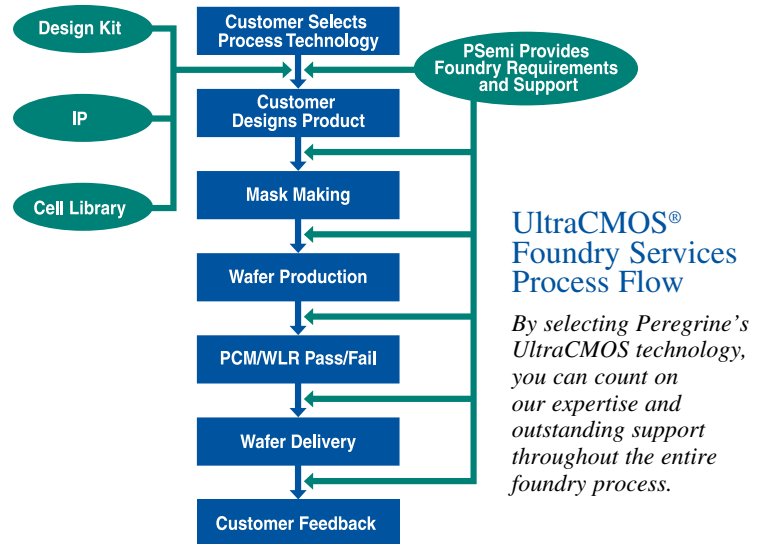


Ask a Question

UltraCMOS® Foundry Services

Peregrine's UltraCMOS® RF and mixed-signal wafer foundry services offer benefits in speed, power, integration and cost. Our comprehensive portfolio of Process Design Kits, standard cell libraries, IP offerings and design services delivers many solutions for today's competitive RF wireless and broadband application challenges. For quick-turn prototyping service, we offer Multi-Project Runs (MPR) on a scheduled basis. This approach enables rapid, low-cost device evolution from design to limited or full production volumes.

At Peregrine Semiconductor, our goal is to ensure customers achieve higher performance integrated circuits without a higher price tag. Contact us at foundry@psemi.com for more information.



How to Contact Us

The Americas

Peregrine Semiconductor Corporation
9380 Carroll Park Drive
San Diego, CA USA 92121
Phone: 858-731-9400
Fax: 858-731-9499

Europe

Peregrine Semiconductor, Europe
Merlin House, Brunel Way,
Theale, Berkshire
RG7 4AB
United Kingdom
Phone: +44-118-902-6520

Japan

Peregrine Semiconductor, K.K.
601 Yaesu Kyodo Bldg
2-5-9 Yaesu, Chuo-ku
Tokyo Japan 104-0028
Phone: +81-3-3527-9847
Fax: +81-3-3527-9848
E-mail : Sales_Japan@psemi.com

Asia Pacific

Peregrine Semiconductor, China
Room 1316, Building 1
Lane 58, East XinJian Road
Shanghai, China 201199
Phone: +86-21-5836-8276
Fax: +86-21-3467-2933

Peregrine Semiconductor, Korea
#C-3004, Kolon Tripolis, 210
Geumgok-dong, Bundang-gu,
Seongnam-si Gyeonggi-do,
463-943 South Korea
Phone: +82-31-728-3939
Fax: +82-31-728-3940

Peregrine Semiconductor, Taiwan
Taipei, Taiwan 11281
Phone: +886-970164578
Fax: +886-2-2822-5867

High-Reliability Products

Americas
9380 Carroll Park Drive
San Diego, CA USA 92121
Phone: 858-731-9475
E-mail: Sales_HiRel@psemi.com

Europe, Asia Pacific
Merlin House, Brunel Way,
Theale, Berkshire
RG7 4AB
United Kingdom
Phone: +44-118-902-6520

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