CEL

SILICON RFIC LOW CURRENT AMPLIFIER FOR MOBILE COMMUNICATIONS

UPC8178TB

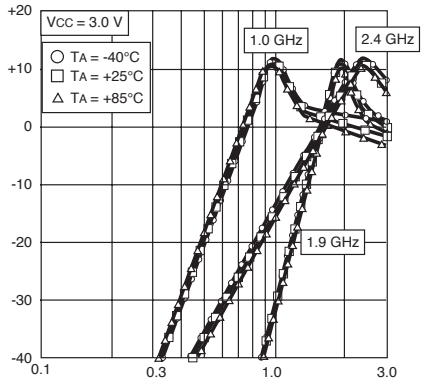
FEATURES

- **LOW CURRENT CONSUMPTION**
  I_{CC} = 1.9 mA TYP @ V_{CC} = 3.0 V
- **SUPPLY VOLTAGE:**
  V_{CC} = 2.4 to 3.3 V
- **EXCELLENT ISOLATION:**
  ISOL = 39 dB TYP @ f = 1.0 GHz
  ISOL = 40 dB TYP @ f = 1.9 GHz
  ISOL = 38 dB TYP @ f = 2.4 GHz
- **POWER GAIN:**
  G_P = 11.0 dB TYP @ f = 1.0 GHz
  G_P = 11.5 dB TYP @ f = 1.9 GHz
  G_P = 11.5 dB TYP @ f = 2.4 GHz
- **OPERATING FREQUENCY:**
  0.1 to 2.4 GHz (Output port LC matching)
- **1 dB GAIN COMPRESSION OUTPUT POWER:**
  $P_{O(1\ dB)}$ = -4.0 dBm TYP @ f = 1.0 GHz
  $P_{O(1\ dB)}$ = -7.0 dBm TYP @ f = 1.9 GHz
  $P_{O(1\ dB)}$ = -7.5 dBm TYP @ f = 2.4 GHz
- **HIGH-DENSITY SURFACE MOUNTING:**
  6-pin super minimold package (2.0 x 1.25 x 0.9 mm)
- **LOW WEIGHT:**
  7 mg (Standard Value)

APPLICATIONS

- Buffer Amplifiers on 0.1 to 2.4 GHz mobile communications system

POWER GAIN vs. FREQUENCY



DESCRIPTION

The UPC8178TB is a silicon monolithic integrated circuit designed as an amplifier for mobile communications. This IC can realize low current consumption with an external chip inductor which cannot be realized on an internal 50 Ω wideband matched IC. This low current amplifier operates on 3.0 V. This device is manufactured using NEC's 30 GHz fmax UHS0 (Ultra High Speed Process) silicon bipolar process which uses direct silicon nitride passivation film and gold electrodes. These materials can protect the chip surface from pollution and prevent corrosion/migration. Thus, this IC has excellent performance, uniformity and reliability.

NEC's stringent quality assurance and test procedures ensure the highest reliability and performance.

ELECTRICAL CHARACTERISTICS

(T_A = 25°C, V_{CC} = V_{OUT} = 3.0 V, Z_S = Z_L = 50 Ω, at LC matched frequency unless otherwise specified))

PART NUMBER PACKAGE OUTLINE					UPC8178TB S06		
SYMBOLS	**PARAMETERS AND CONDITIONS[1]**			**UNITS**	**MIN**	**TYP**	**MAX**
I_{CC}	Circuit Current (no signal)			mA	1.4	1.9	2.4
G_P	Power Gain	f = 1.0 GHz		dB	9.0	11.0	13.0
		f = 1.9 GHz		dB	9.0	11.5	13.5
		f = 2.4 GHz		dB	9.0	11.5	13.5
ISOL	Isolation	f = 1.0 GHz		dB	34	39	–
		f = 1.9 GHz		dB	35	40	–
		f = 2.4 GHz		dB	33	38	–
$P_{O(1dB)}$	1 dB Gain Compression Output Power		f = 1.0 GHz	dBm	-8.0	-4.0	–
			f = 1.9 GHz	dBm	-11.0	-7.0	–
			f = 2.4 GHz	dBm	-11.5	-7.5	–
NF	Noise Figure	f = 1.0 GHz		dB	–	5.5	7.0
		f = 1.9 GHz		dB	–	5.5	7.0
		f = 2.4 GHz		dB	–	5.5	7.0
RLin	Input Return Loss	f = 1.0 GHz		dB	4	7	–
		f = 1.9 GHz		dB	5	8	–
		f = 2.4 GHz		dB	6.5	9.5	–

ABSOLUTE MAXIMUM RATINGS[1]

(T_A = +25°C unless otherwise specified)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CC}	Supply Voltage[2]	V	3.6
I_{CC}	Circuit Current	mA	15
P_D	Power Dissipation[3]	mW	270
T_A	Operating Ambient Temperature	°C	-40 to +85
T_{STG}	Storage Temperature	°C	-55 to +150
P_{IN}	Input Power	dBm	+5

Notes:
1. Operation in excess of any one of these conditions may result in permanent damage.
2. Pins 4 and 6.
3. Mounted on a double-sided copper clad 50x50x1.6 mm epoxy glass PWB, T_A = +85°C.

RECOMMENDED OPERATING CONDITIONS

SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V_{CC}	Supply Voltage[1]	V	2.4	3.0	3.3
T_A	Operating Ambient Temperature	˚C	-40	+25	+85

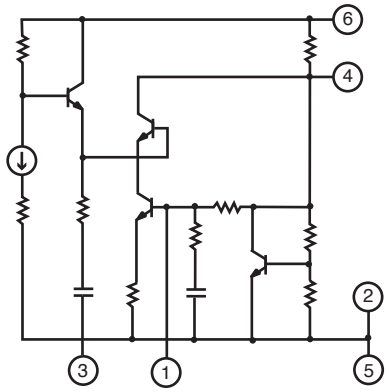
Note:
1. Same voltage applied to pins 4 and 6.

SERIES PRODUCTS[1] (T_A = +25°C, V_{CC} = V_{out} = 3.0 V, Z_S = Z_L = 50 Ω)

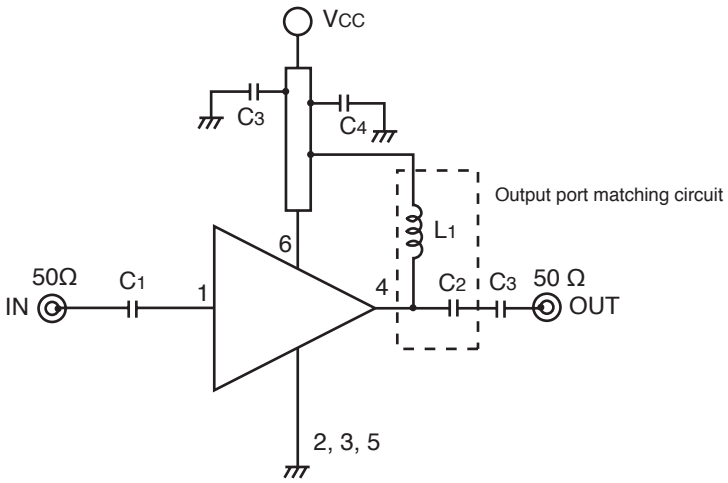
Parameter / Part No.	I_{CC} (mA)	1.0 GHz output port matching frequency			1.66 GHz output port matching frequency			1.9 GHz output port matching frequency			2.4 GHz output port matching frequency			Marking
		G_P (dB)	ISOL (dB)	$P_{O(1\ dB)}$ (dBm)	G_P (dB)	ISOL (dB)	$P_{O(1\ dB)}$ (dBm)	G_P (dB)	ISOL (dB)	$P_{O(1\ dB)}$ (dBm)	G_P (dB)	ISOL (dB)	$P_{O(1\ dB)}$ (dBm)	
UPC8178TB	1.9	11	39	-4.0	–	–	–	11.5	40	-7.0	11.5	38	-7.5	C3B
UPC8179TB	4.0	13.5	44	+3.0	–	–	–	15.5	42	+1.5	15.5	41	+1.0	C3C
UPC8128TB	2.8	12.5	39	-4.0	13	39	-4.0	13	37	-4.0	–	–	–	C2P
UPC8151TB	4.2	12.5	38	+2.5	15	36	+1.5	15	34	+0.5	–	–	–	C2U
UPC8152TB	5.6	23	40	-4.5	19.5	38	-8.5	17.5	35	-8.5	–	–	–	C2V

Note:
1. Typical performance.

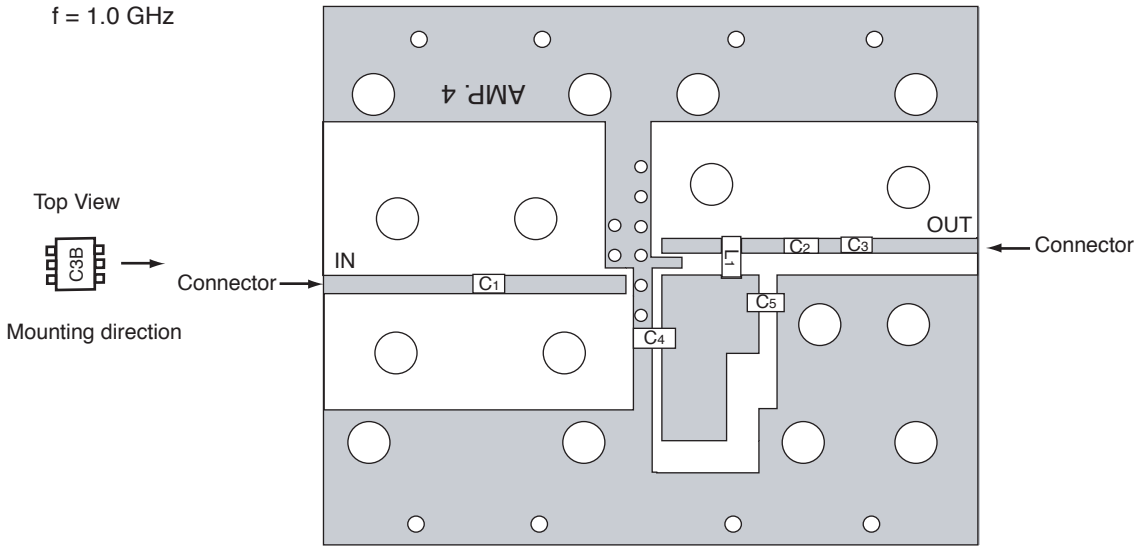
PIN FUNCTIONS (Pin Voltage is measured at V_{CC} = 3.0 V)

Pin No.	Pin Name	Applied Voltage (V)	Pin Voltage (V)	Function and Applications	Internal Equivalent Circuit
1	Input	—	0.91	Signal input pin. An internal matching circuit, configured with resistors, enables a 50 Ω connection over a wide band. This pin must be coupled to the signal source with the capacitor for DC out.	
2 3 5	GND	0	—	Ground pin. This pin should be connected to the system ground with minimum inductance. Ground pattern on the board should be formed as wide as possible. All the ground pins must be connected together with a wide ground pattern to decrease impedance difference.	
4	Output	Voltage same as V_{CC} through external inductor	–	Signal output pin. This pin is designed as the collector output. Due to the high impedance output, this pin should be externally equipped with LC matching circuit to next stage. For L, a size 1005 chip inductor can be used.	
6	V_{CC}	2.4 to 3.3		Power supply pin. This pin should be externally equipped with a bypass capacitor to minimize it's impedance.	

TEST CIRCUIT 1 (f = 1.0 GHz)



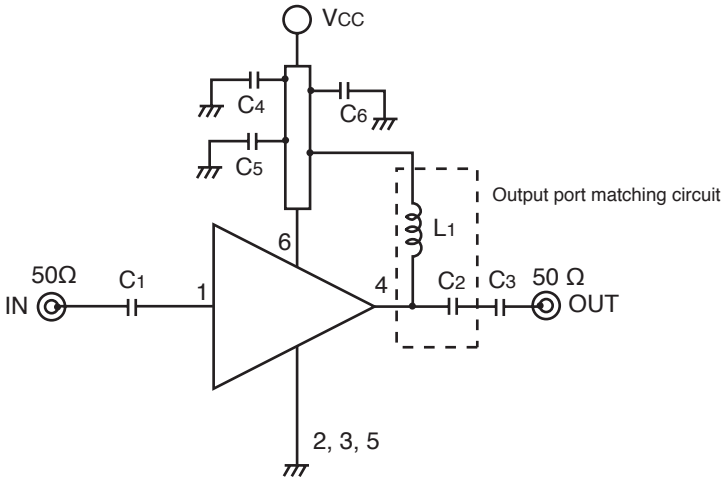
EXAMPLE OF TEST CIRCUIT 1 ASSEMBLED ON EVALUATION BOARD



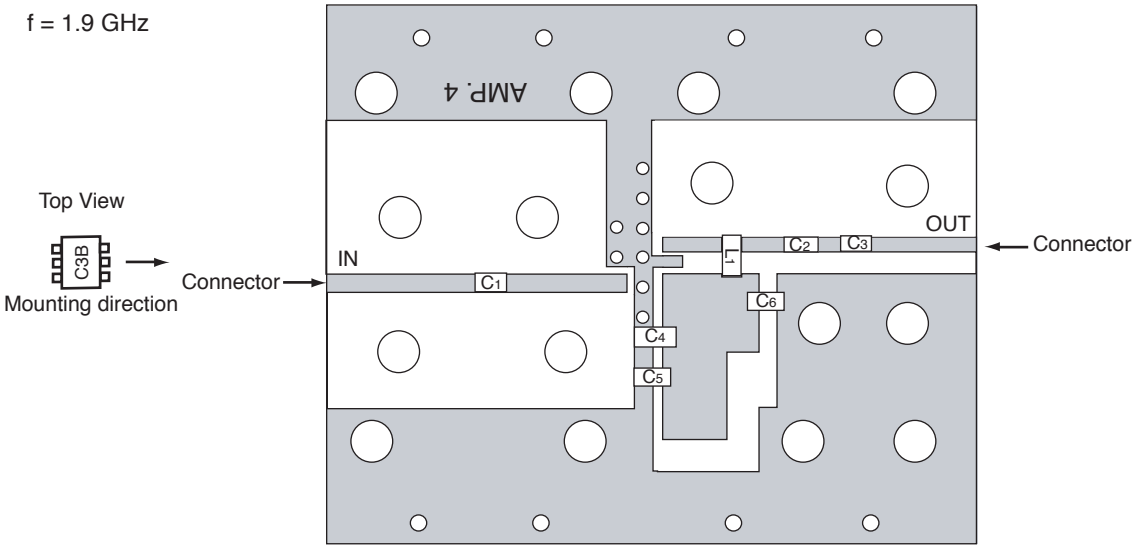
COMPONENT LIST

	1.0 GHz Output Port Matching
C_1, C_3, C_5	1000 pF
C_2	0.75 pF
C_4	10 pF
L_1	12 nH

TEST CIRCUIT 2 (f = 1.9 GHz)



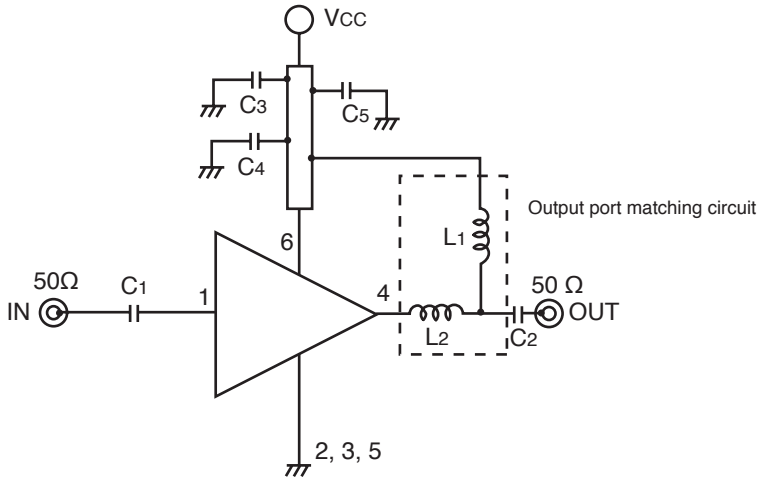
EXAMPLE OF TEST CIRCUIT 2 ASSEMBLED ON EVALUATION BOARD



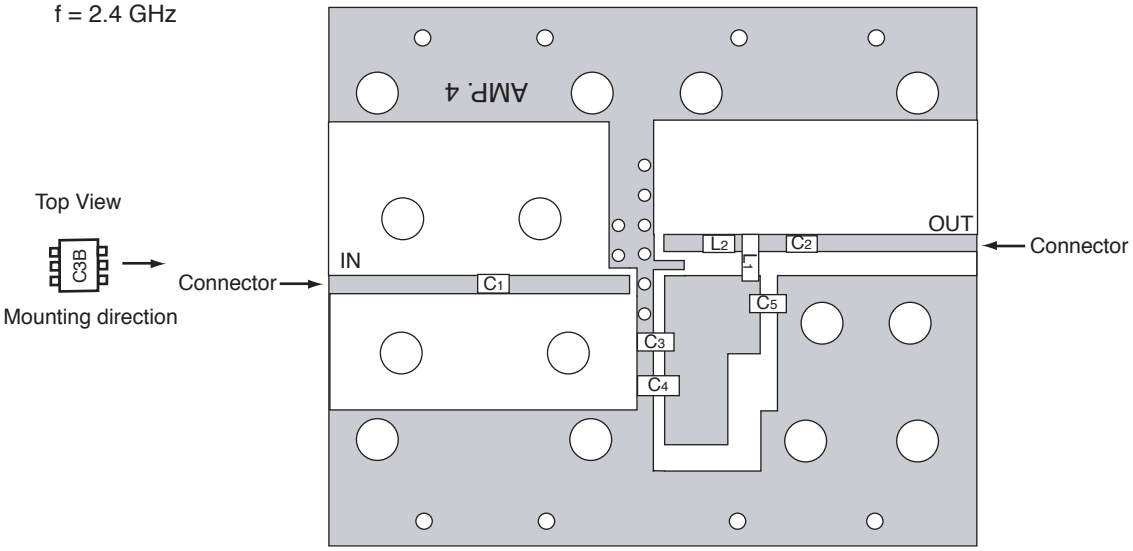
COMPONENT LIST

	1.9 GHz Output Port Matching
C_1, C_3, C_5, C_6	1000 pF
C_2	0.5 pF
C_4	10 pF
L_1	3.9 nH

TEST CIRCUIT 3 (f = 2.4 GHz)



EXAMPLE OF TEST CIRCUIT 3 ASSEMBLED ON EVALUATION BOARD



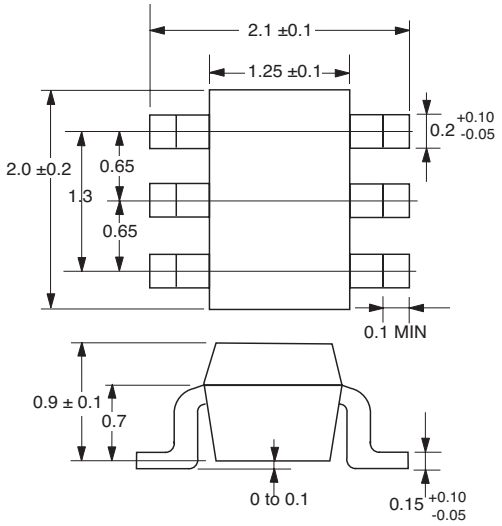
COMPONENT LIST

	2.4 GHz Output Port Matching
C_1, C_3, C_4, C_5	1000 pF
C_3	10 pF
L_1	1.8 nH
L_2	2.7 nH

NOTES:
1. 42 x 35 x 0.4 mm double sided copper clad polyimide board.
2. Solder plated on pattern.
3. Back side: GND pattern.
4. ○ ◯ Through holes.

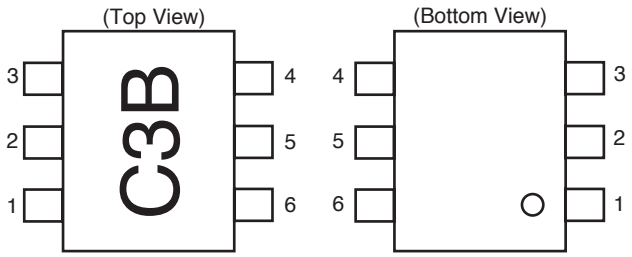
OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE S06



Note:
All dimensions are typical unless otherwise specified.

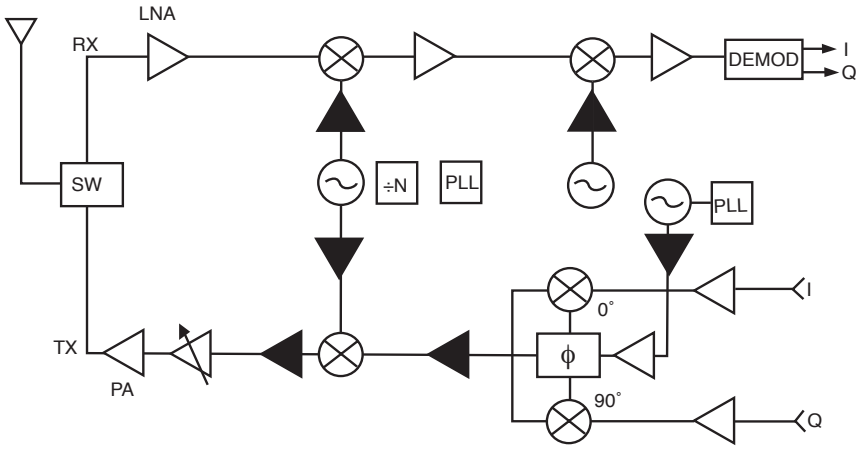
PIN CONNECTIONS



PIN NO.	PIN NAME
1	Input
2	GND
3	GND
4	Output
5	GND
6	V_{CC}

SYSTEM APPLICATION EXAMPLE

Location examples in digital cellular



ORDERING INFORMATION

Part Number	Quantity
UPC8178TB-E3-A	3 K pcs/reel

Note: Embossed tape, 8 mm wide. Pins 1, 2 and 3 face the tape perforation side.

Life Support Applications
These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
Lead (Pb)	< 1000 PPM	-A	-AZ
		Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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