

DATA SHEET

NEC

Si ANALOG INTEGRATED CIRCUIT μ PC8218T5A

SILICON RF POWER AMPLIFIER IC FOR 1.9 GHz PHS

DESCRIPTION

The μ PC8218T5A is a silicon monolithic integrated circuit designed for use as power amplifier 1.9 GHz PHS. This IC consists of three stage amplifiers as driver stage and final stage of power amplifier.

This device is packaged in surface mount 16-pin TSON (Thin Small Outline Non-leaded) plastic package.

FEATURES

- Output Power : $P_{out} = +20.5$ dBm MIN. @ $P_{in} = -19$ dBm, $f = 1.9$ GHz
- Operation Current : $I_{op} = 150$ mA TYP.
- Single Supply Voltage : $V_{DS} = 3.0$ V TYP.
- Suitable for High-density Surface Mounting : 16-pin Plastic TSON package ($3.3 \times 2.3 \times 0.6$ mm)

APPLICATION

- 1.9 GHz applications (Example : PHS etc.)

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μ PC8218T5A-E1	16-pin Plastic TSON	8218	<ul style="list-style-type: none">• Embossed tape 12 mm wide• Pin 8, 9 face the perforation side of the tape• Qty 3 kpcs/reel

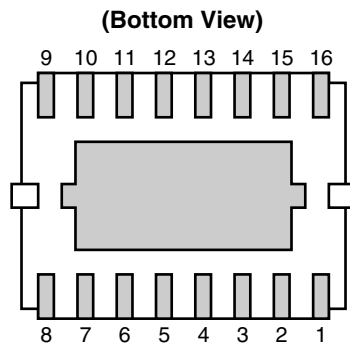
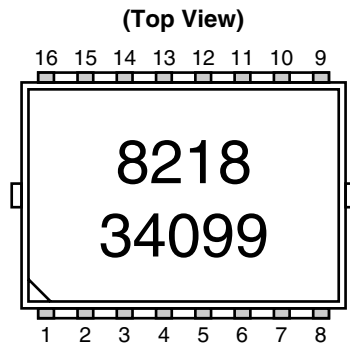
Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: μ PC8218T5A

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

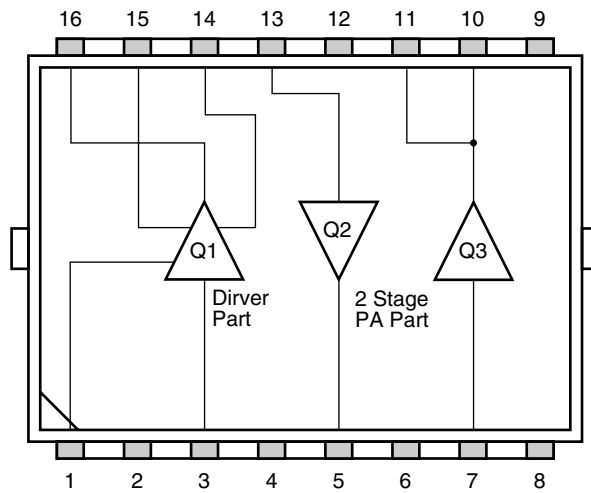
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PIN CONNECTIONS



Pin No.	Pin Name
1	Vcc1
2	GND
3	INPUT1
4	GND
5	OUTPUT2
6	GND
7	INPUT3
8	NC
9	GND
10	OUTPUT3
11	OUTPUT3
12	GND
13	INPUT2
14	GND
15	GND
16	OUTPUT1

INTERNAL BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Ratings	Unit
Operating Ambient Temperature	T _A		-40 to +85	°C
Storage Temperature	T _{stg}		-55 to +150	°C
Channel Temperature	T _{ch}		150	°C
Power Dissipation of Package	P _D	T _A = +85°C	Note 4.33	W
Driver Part (Q1)				
Supply Voltage	V _{CC}		3.6	V
Circuit Current	I _{CC1}		60	mA
Maximum Input Power	P _{in1}		+10	dBm
2 Stage PA Part (Q2+Q3)				
Drain to Source Voltage	V _{DS}		8.0	V
Gate to Source Voltage	V _{GS}		8.0	V
Drain Current of Q2	I _{DS2}		45	mA
Drain Current of Q3	I _{DS3}		259	mA
Maximum Input Power to Q2	P _{in2}		+12	dBm
Maximum Input Power to Q3	P _{in3}		+16	dBm

Note Mounted on 33 × 21 × 0.4 mm epoxy glass PWB

RECOMMENDED OPERATING RANGE

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Operating Ambient Temperature	T _A		-40	+25	+85	°C
Driver Part (Q1)						
Supply Voltage	V _{CC}		2.7	3.0	3.3	V
2 Stage PA Part (Q2+Q3)						
Drain to Source Voltage	V _{DS}		2.7	3.0	3.5	V
Gate to Source Voltage	V _{GS}	T _A = +25°C	0	2.0	2.5	V
Maximum Input Power to Q2	P _{in2}	V _{DS} = 3 V, T _A = +25°C		2.0	5.0	dBm
Maximum Input Power to Q3	P _{in3}	V _{DS} = 3 V, T _A = +25°C		11.0	15.0	dBm

ELECTRICAL CHARACTERISTICS (f = 1.9 GHz, V_{CC} = V_{DS} = 3.0 V, T_A = +25°C, unless otherwise specified, using our standard test fixture)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
All Part (Driver Part + 2 Stage PA Part, Q1+Q2+Q3)						
Gate Voltage Adjusted Range	V _{GS}	P _{in} = -19 dBm, P _{out} = 20.5 dBm	1.2	1.8	2.3	V
Power Added Efficiency	η _{add}		-	25.0	-	%
Operation Current Consumption	I _{op}		-	150	175	mA
Input Return Loss	RL _{in}	P _{in} = -20 dBm	-	8	-	dB
Output Return Loss	RL _{out}		-	3	-	dB
Output Power	P _{out}	P _{in} = -19 dBm	20.5	-	-	dBm
Power Gain	G _P		39.5	-	-	dB
Liner Gain	G _L	P _{in} = -20 dBm	-	40.5	-	dB
Adjacent Channel Power 1	P _{adj (600)}	P _{in} = -19 dBm, Δ600 kHz	-	-62	-55	dBc
	P _{adj (900)}		P _{in} = -19 dBm, Δ900 kHz	-	-70	-60
Occupied Band Width	OBW	P _{in} = -19 dBm	-	250.0	270.0	kHz
2nd Harmonics Frequency Level	2f ₀		-	-44	-	dBc
3rd Harmonics Frequency Level	3f ₀		-	-60	-	dBc
Gain 1 dB Compression Output Power	P _{O (1 dB)}		-	21.0	-	dBm
Driver Part (Q1)						
Circuit Current	I _{CC}	No RF Signal	-	23	-	mA
Power Gain	G _P	P _{in} = -30 dBm	-	21.0	-	dB
Isolation	ISL		-	32.0	-	dB
Input Return Loss	RL _{in}		-	10.5	-	dB
Output Return Loss	RL _{out}		-	10.0	-	dB
Gain 1 dB Compression Output Power	P _{O (1 dB)}		-	8.5	-	dBm
Saturated Output Power	P _{O (sat)}	P _{in} = -5 dBm	-	10.0	-	dBm

ELECTRICAL CHARACTERISTICS (f = 1.9 GHz, V_{CC} = V_{DS} = 3.0 V, T_A = +25°C, unless otherwise specified, using our standard test fixture)

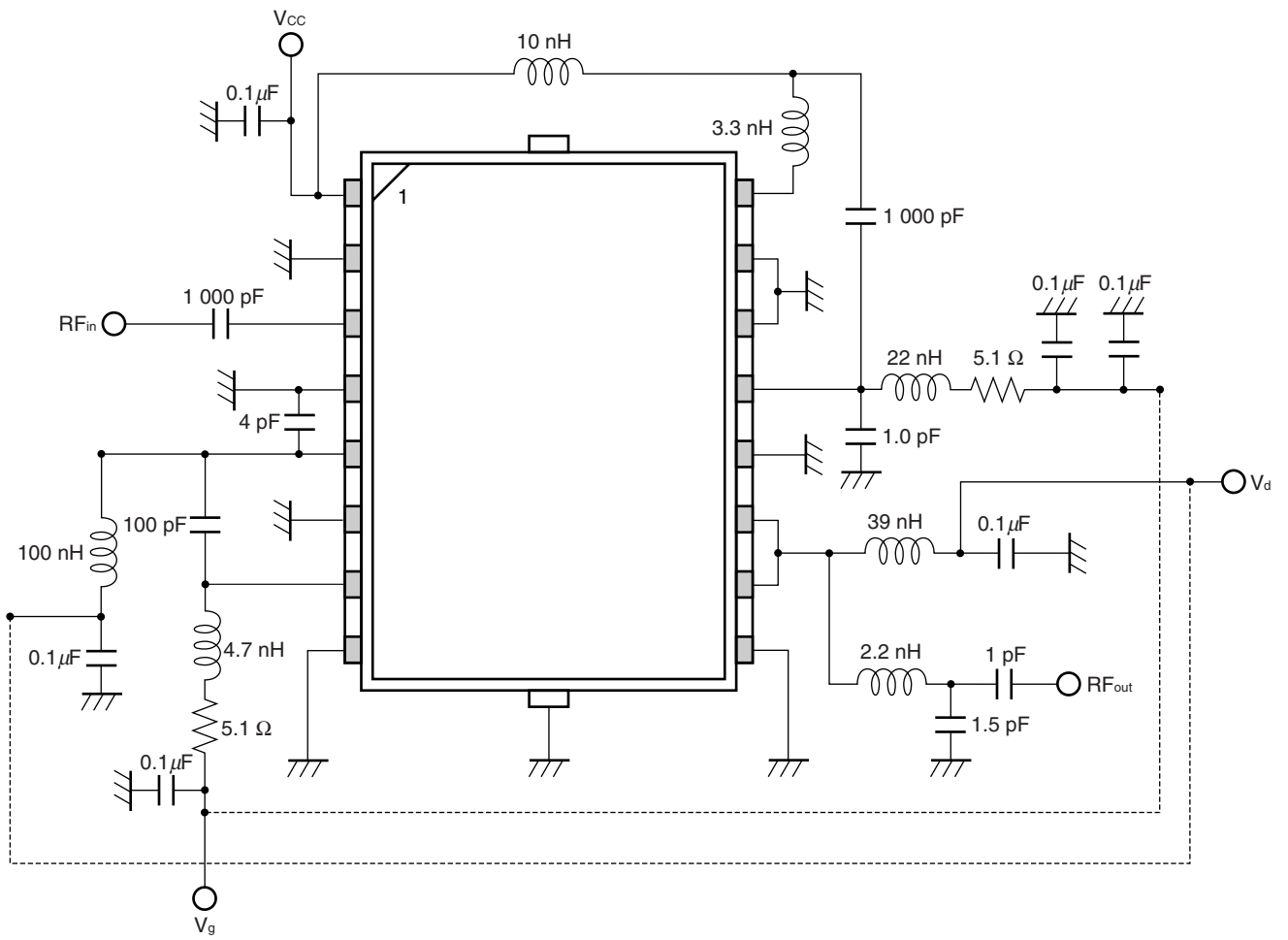
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
2 Stage PA Part (Q2+Q3)						
Gate Bias Voltage	V _{GS}	P _{in} = -5 dBm, P _{out} = -20.5 dBm	-	1.8	-	V
Power Added Efficiency	η _{add}		-	30.0	-	%
Drain Current	I _{DS} ^{Note}		-	121	-	mA
Input Return Loss	RL _{in}	P _{in} = -20 dBm	-	10.0	-	dB
Output Return Loss	RL _{out}		-	3	-	dB
Output Power	P _{out}	P _{in} = -5 dBm	-	21.0	-	dBm
Power Gain	G _P		-	26.0	-	dB
Linear Gain	G _L	P _{in} = -20 dBm	-	26.0	-	dB
Adjacent Channel Power 1	P _{adj (600)}	P _{in} = -5 dBm, Δ1600 kHz	-	-60	-	dBc
Adjacent Channel Power 1	P _{adj (900)}	P _{in} = -5 dBm, Δ1900 kHz	-	-70	-	dBc
Occupied Band Width	OBW	P _{in} = -5 dBm	-	250.0	-	kHz
2nd Harmonics Frequency Level	2f _o		-	-40	-	dBc
3rd Harmonics Frequency Level	3f _o		-	-45	-	dBc
Gain 1 dB Compression Output Power	P _{O (1 dB)}		-	21.0	-	dBm

Note I_{DS} is total drain currents of Q2 and Q3 part

DC CHARACTERISTICS (T_A = +25°C, unless otherwise specified)

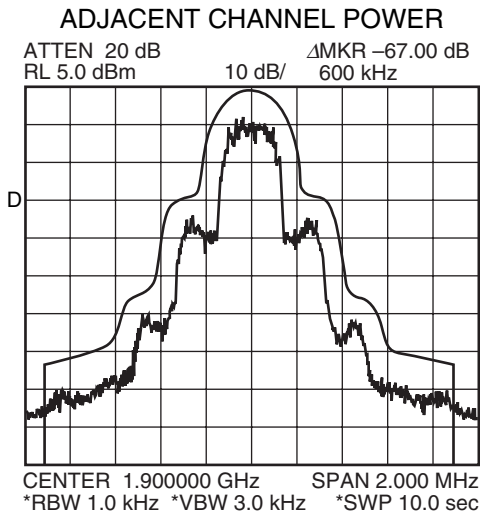
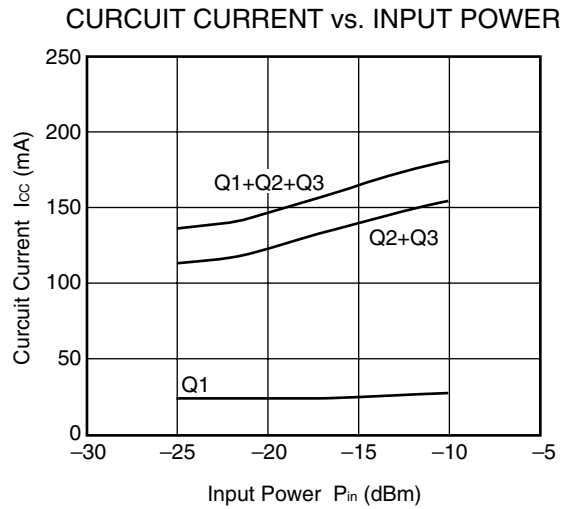
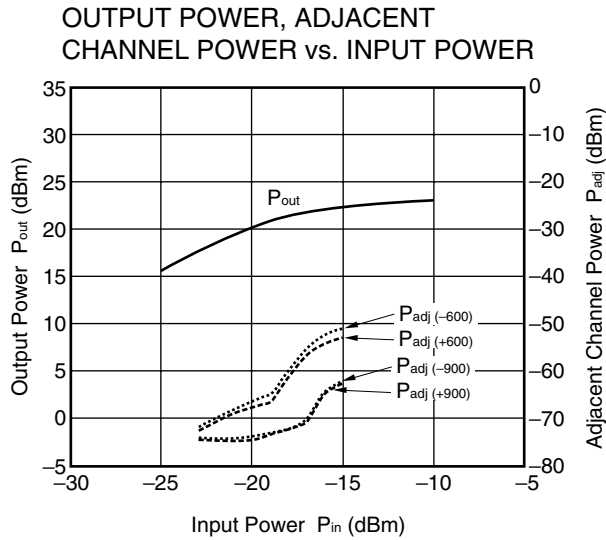
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Driver Part (Q1)						
Collector Current	I _{CC}	V _{CC} = 3.0 V	-	23	30	mA
2 Stage PA Part (Q2)						
On-state Resistance 2	R _{on2}	V _{DS} = 0.1 V, V _{GS} = 6 V	-	4.35	-	Ω
Drain to Source Breakdown Voltage 2	BV _{DSS2}	I _{DS} = 1.4 μA	10.0	12.0	16.0	V
Gate to Source Breakdown Voltage 2	BV _{GSS2}	I _{GS} = 1.4 μA	6.0	11.5	16.0	V
Gate Threshold Voltage 2	V _{th2}	V _{DS} = 3.5 V, I _{DS} = 1.4 mA	1.15	1.40	1.65	V
Transconductance 2	g _{m2}	V _{DS} = 3.5 V, I _{DS} = 25 mA	50	70	-	mS
2 Stage PA Part (Q3)						
On-state Resistance 3	R _{on3}	V _{DS} = 0.1 V, V _{GS} = 6 V	-	1.02	-	Ω
Drain to Source Breakdown Voltage 3	BV _{DSS3}	I _{DS} = 8.0 μA	10.0	12.0	16.0	V
Gate to Source Breakdown Voltage 3	BV _{GSS3}	I _{GS} = 8.0 μA	6.0	11.5	16.0	V
Gate Threshold Voltage 3	V _{th3}	V _{DS} = 3.5 V, I _{DS} = 8.0 mA	1.15	1.40	1.65	V
Transconductance 3	g _{m3}	V _{DS} = 3.5 V, I _{DS} = 150 mA	290	370	-	mS

TEST CIRCUIT



Remark Back Surface on GND

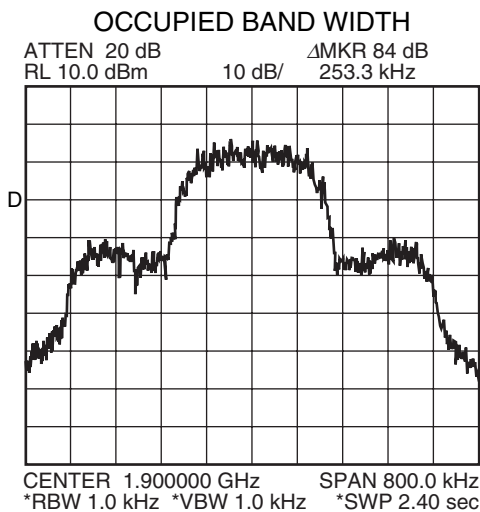
TYPICAL CHARACTERISTICS (f = 1.9 GHz, V_{DS} = V_{CC} = 3 V, T_A = +25°C, unless otherwise specified)



$P_{out} = 20.5$ dBm, $P_{in} = -19$ dBm
 $P_{adj} (+600$ kHz) = -67.0 dBc
 $P_{adj} (+900$ kHz) = -73.3 dBc

<Measurement Conditions>
 Signal Generator Anritsu MG3670B
 MOD : $\pi/4$ DQPSK
 bit rate : 384 kbps
 Source : internal
 Filtra : RNYQ
 Roll Off: 0.5
 Phase Encode : Normal
 Burst : Off
 Pattern : PN9

Spectrum Analyzer HP8561E
 PBW : 1.0 kHz
 VBW : 3.0 kHz
 SPAN : 2 MHz
 SWP : 10 sec
 ATT : > 10 dB
 Channel-SP : 600 kHz
 Channel-BW : 192 kHz



$P_{out} = 20.5$ dBm, $P_{in} = -19$ dBm

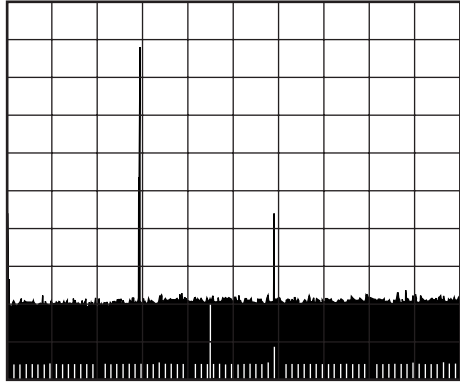
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 MOD : $\pi/4$ DQPSK
 bit rate : 384 kbps
 Source : internal
 Filtra : RNYQ
 Roll Off: 0.5
 Phase Encode : Normal
 Burst : Off
 Pattern : PN9

Spectrum Analyzer HP8561E
 PBW : 1.0 kHz
 VBW : 1.0 kHz
 SPAN : 800 kHz
 SWP : 2.4 sec
 Signal : < 5 dB form
 REF Level

Remark The graphs indicate nominal characteristics.

FREQUENCY BAND WIDTH

ATTEN 30 dB Δ MKR -43.50 dB
RL 20.0 dBm 10 dB/ 1.928 GHz



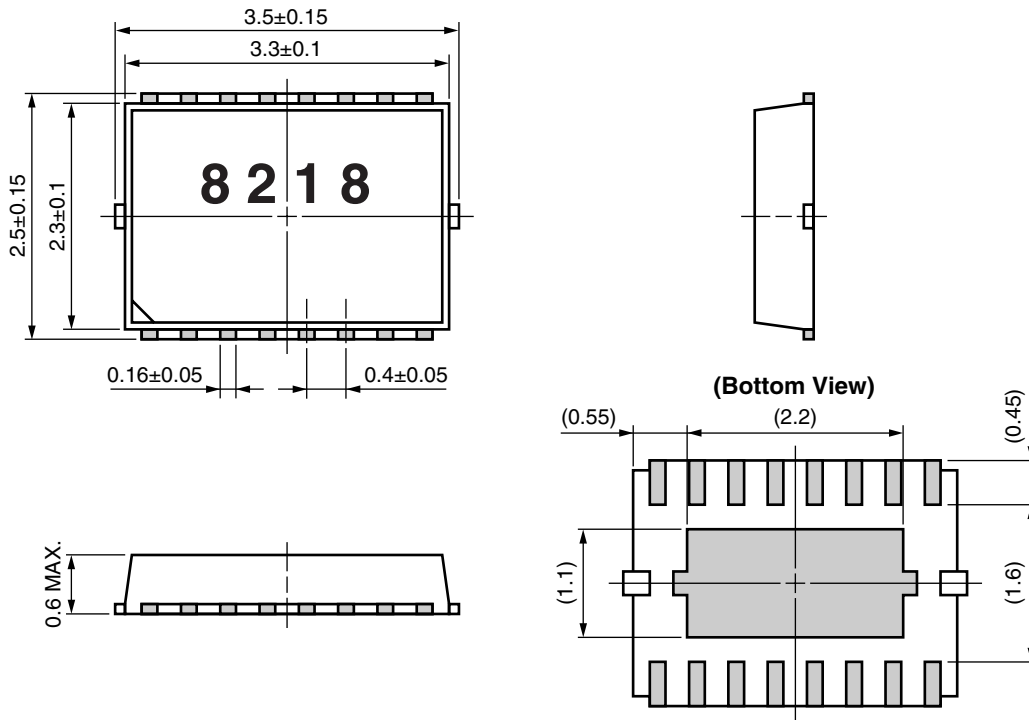
$P_{out} = 20.5 \text{ dBm}$, $P_{in} = -19 \text{ dBm}$
 $2f_0 = -43.5 \text{ dBc}$
 $3f_0 < -60 \text{ dBc}$

CENTER 3.250 GHz SPAN 6.500 GHz
*RBW 30 kHz *VBW 30 kHz *SWP 19.0 sec

Remark The graph indicates nominal characteristics.

PACKAGE DIMENSIONS

16-PIN PLASTIC TSON (UNIT: mm)



Remark (): Reference value

NOTES ON CORRECT USE

- (1) Observe precautions for handling because of electro-static sensitive devices.
- (2) Form a ground pattern as widely as possible to minimize ground impedance (to prevent undesired oscillation).
All the ground pins must be connected together with wide ground pattern to decrease impedance difference.
- (3) The bypass capacitor should be attached to Vcc line.

RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

Soldering Method	Soldering Conditions	Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	IR260
Wave Soldering	Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	WS260
Partial Heating	Peak temperature (pin temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	HS350

Caution Do not use different soldering methods together (except for partial heating).

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M8E 00.4-0110

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