NEC

BIPOLAR ANALOG INTEGRATED CIRCUITS

μPC79L00 SERIES

THREE TERMINAL NEGATIVE VOLTAGE REGULATORS

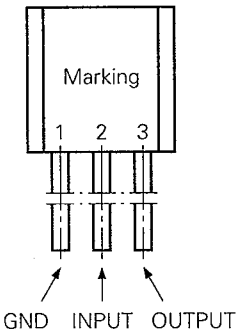
DESCRIPTION

The μPC79L00 series are monolithic three terminal negative voltage regulators fixed output voltages of −5 V, −8 V, −12 V, −15 V with output current capabilities in excess of 100 mA. These devices employ internally current limiting, thermal shutdown, and safe-area compensation, make them essentially indestructible. They are intended as fixed voltage regulators in a wide range of application including local (on-card) regulator for elimination of distribution problems associated with single point regulation.

FEATURES

- Output current in excess of 0.1 A.
- Internal thermal overload protection.
- Internal short circuit current limiting.
- Low noise : 31 $\mu V_{r.m.s.}$ (μPC79L05)
- High Ripple Rejection : 85 dB (μPC79L05)

CONNECTION DIAGRAM

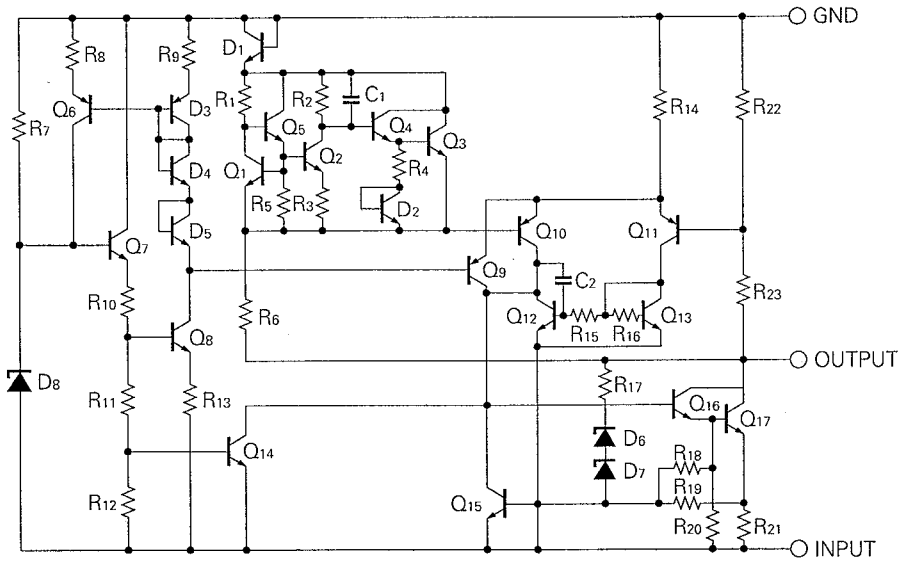


ORDER INFORMATION

TYPE NUMBER	OUTPUT VOLTAGE	PACKAGE	QUALITY GRADE
μPC79L05J	−5 V	TO-92	Standard
μPC79L08J	−8 V		
μPC79L12J	−12 V		
μPC79L15J	−15 V		

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

EQUIVALENT CIRCUIT



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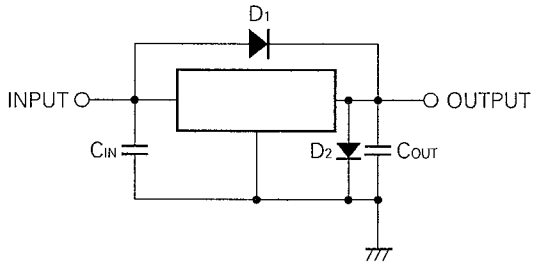
ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

ITEM	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	–30/–35 (Note1)	V
Internal Power Dissipation	P_T	700	mW
Operating Ambient Temperature Range	T_{opt}	–20 to +85	°C
Operating Junction Temperature Range	$T_{opt\ (j)}$	–20 to +150	°C
Storage Temperature Range	T_{stg}	–55 to +150	°C
Thermal Resistance (junction to case)	$R_{th\ (j-a)}$	180	°C/W

(Note 1) μPC79L05, 08 : –30 V, μPC79L12, 15 : –35 V

TYPICAL CONNECTION



C_{IN}: Required if regulator is located an appreciable distance from power supply filter (More than 2.2 μF)

C_{OUT}: More than 1 μF

D_1: Needed for $V_{IN} > V_O$

D_2: Needed for $V_O >$ GND

RECOMMENDED OPERATING CONDITIONS

ITEM	SYMBOL	TYPE NUMBER	MIN.	TYP.	MAX.	UNIT
Input Voltage	V_{IN}	μPC79L05	–7	–10	–20	V
		μPC79L08	–10.5	–14	–23	
		μPC79L12	–14.5	–19	–27	
		μPC79L15	–17.5	–23	–30	
Output Current	I_O	All	0	40	70	mA
Operating Temperature Range	T_{opt}	All	–20		+85	°C
Operating Junction Temperature Range	$T_{opt\ (j)}$	All	–20		+125	°C

ELECTRICAL CHARACTERISTICS μPC79L05

(V_{IN} = −10 V, I_O = 40 mA, 0 °C ≦ T_j ≦ 125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	−4.8	−5.0	−5.2	V
		−7 V ≦ V_{IN} ≦ −20 V, 1 mA ≦ I_O ≦ 40 mA	−4.75		−5.25	
Line Regulation	REG_{IN}	T_j = 25 °C, −7 V ≦ V_{IN} ≦ −20 V		3	60	mV
Load Regulation	REG_L	T_j = 25 °C, 1 mA ≦ I_O ≦ 100 mA		10	50	mV
Quiescent Current	I_{BIAS}	T_j = 25 °C		4.2	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	−7 V ≦ V_{IN} ≦ −20 V, I_O = 40 mA			0.5	mA
		V_{IN} = −10 V, 1 mA ≦ I_O ≦ 40 mA			0.1	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		31	200	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, −8 V ≦ V_{IN} ≦ −18 V, f = 120 Hz	65	85		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		0.9		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = −20 V		95		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.4		mV/°C

ELECTRICAL CHARACTERISTICS μPC79L08

(V_{IN} = −14 V, I_O = 40 mA, 0 °C ≦ T_j ≦ 125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	−7.7	−8.0	−8.3	V
		−10.5 V ≦ V_{IN} ≦ −23 V, 1 mA ≦ I_O ≦ 40 mA	−7.6		−8.4	
Line Regulation	REG_{IN}	T_j = 25 °C, −10.5 V ≦ V_{IN} ≦ −23 V		5	60	mV
Load Regulation	REG_L	T_j = 25 °C, 1 mA ≦ I_O ≦ 100 mA		12	80	mV
Quiescent Current	I_{BIAS}	T_j = 25 °C		4.3	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	−10.5 V ≦ V_{IN} ≦ −23 V, I_O = 40 mA			0.5	mA
		V_{IN} = −14 V, 1 mA ≦ I_O ≦ 40 mA			0.1	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		56	220	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, −12 V ≦ V_{IN} ≦ −22 V, f = 120 Hz	63	75		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		0.9		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = −23 V		75		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.6		mV/°C

ELECTRICAL CHARACTERISTICS μPC79L12

(V_{IN} = −19 V, I_O = 40 mA, 0 °C ≦ T_j ≦ 125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	−11.5	−12.0	−12.5	V
		−14.5 V ≦ V_{IN} ≦ −27 V, 1 mA ≦ I_O ≦ 40 mA	−11.4		−12.6	
Line Regulation	REG_{IN}	T_j = 25 °C, −14.5 V ≦ V_{IN} ≦ −27 V		8	45	mV
Load Regulation	REG_L	T_j = 25 °C, 1 mA ≦ I_O ≦ 100 mA		15	100	mV
Quiescent Current	I_{BIAS}	T_j = 25 °C		4.4	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	−14.5 V ≦ V_{IN} ≦ −30 V, I_O = 40 mA			0.5	mA
		V_{IN} = −19 V, 1 mA ≦ I_O ≦ 40 mA			0.1	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		88	280	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, −15 V ≦ V_{IN} ≦ −25 V, f = 120 Hz	55	70		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		0.9		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = −27 V		50		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.8		mV/°C

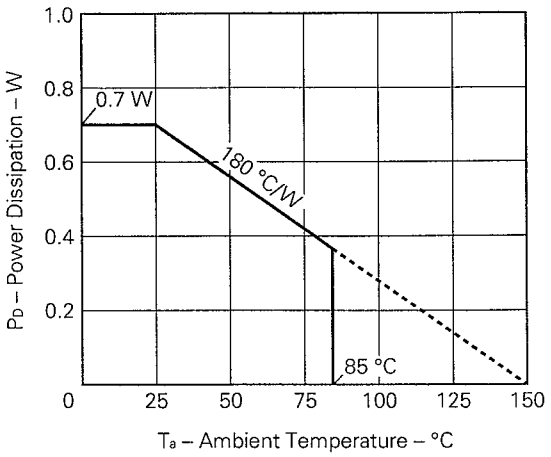
ELECTRICAL CHARACTERISTICS μPC79L15

(V_{IN} = −23 V, I_O = 40 mA, 0 °C ≦ T_j ≦ 125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

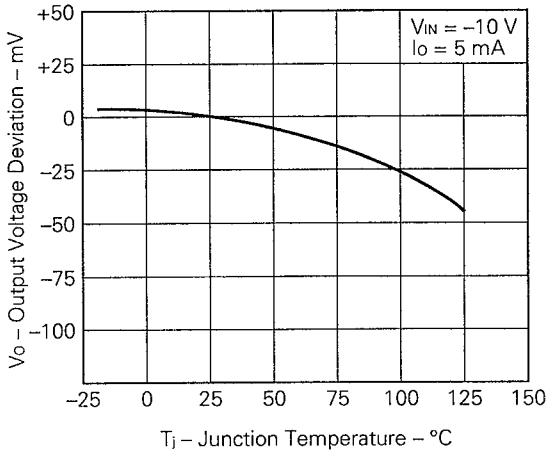
CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	−14.4	−15.0	−15.6	V
		−17.5 V ≦ V_{IN} ≦ −30 V, 1 mA ≦ I_O ≦ 40 mA	−14.25		−15.75	
Line Regulation	REG_{IN}	T_j = 25 °C, −17.5 V ≦ V_{IN} ≦ −30 V		10	45	mV
Load Regulation	REG_L	T_j = 25 °C, 1 mA ≦ I_O ≦ 100 mA		20	125	mV
Quiescent Current	I_{BIAS}	T_j = 25 °C		4.5	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	−17.5 V ≦ V_{IN} ≦ −30 V, I_O = 40 mA			0.5	mA
		V_{IN} = −23 V, 1 mA ≦ I_O ≦ 40 mA			0.1	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		100	360	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, −18.5 V ≦ V_{IN} ≦ −28.5 V, f = 120 Hz	55	65		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		0.9		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = −30 V		25		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		1.0		mV/°C

TYPICAL CHARACTERISTICS (T_a = 25 °C)

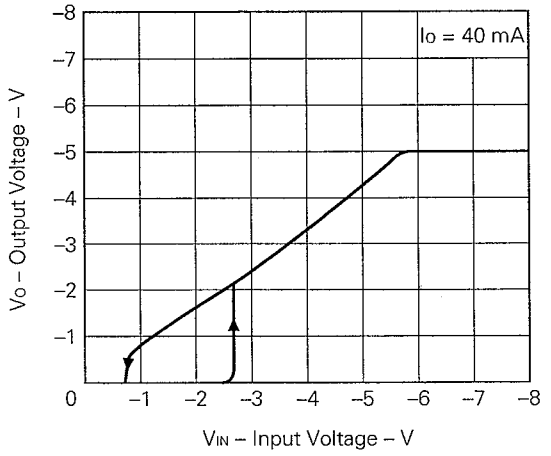
P_D – T_a



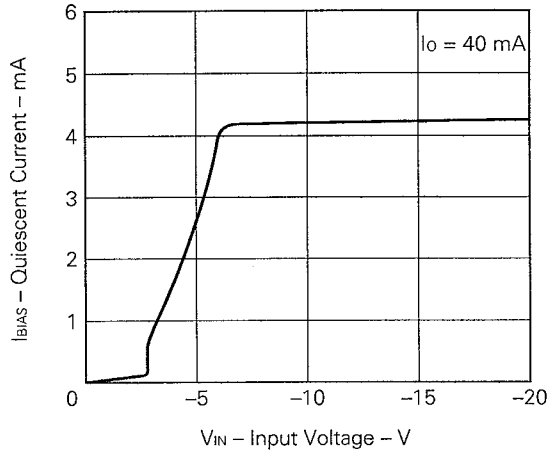
ΔVo – Tj (μPC79L05)



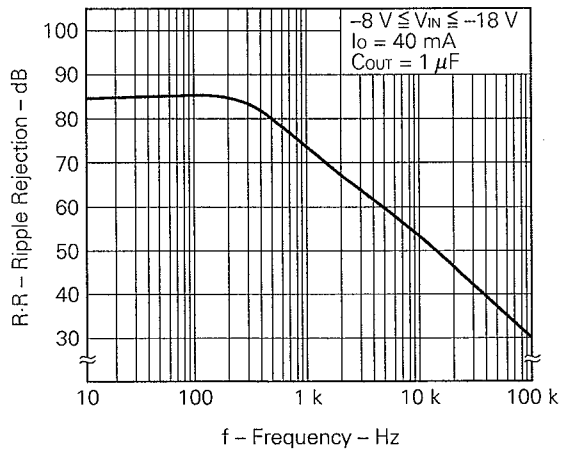
Vo – VIN (μPC79L05)



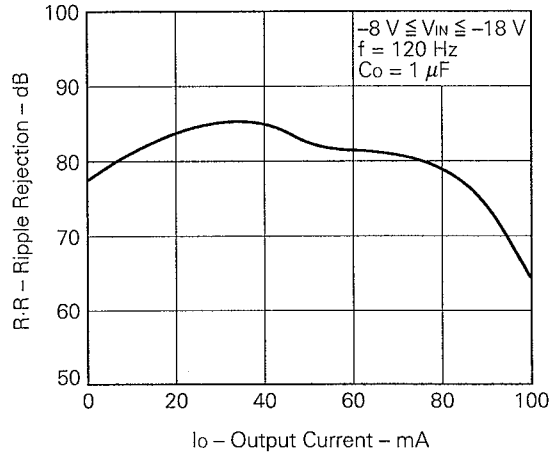
IBIAS – VIN (μPC79L05)



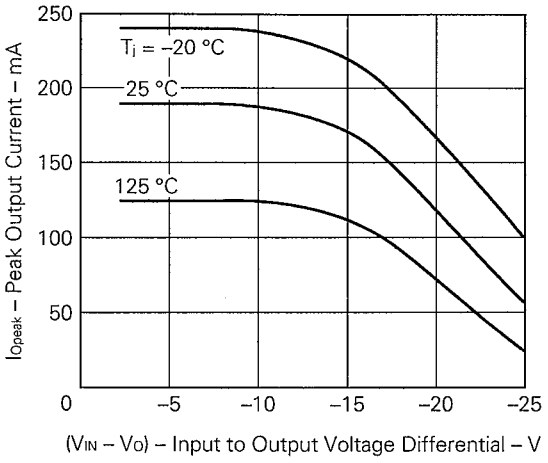
R·R – f (μPC79L05)



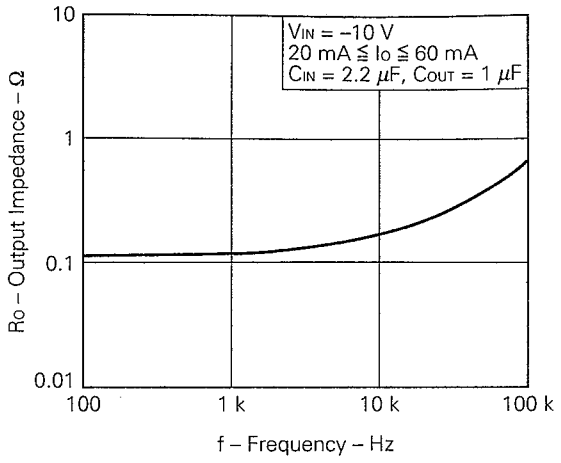
R·R – Io (μPC79L05)



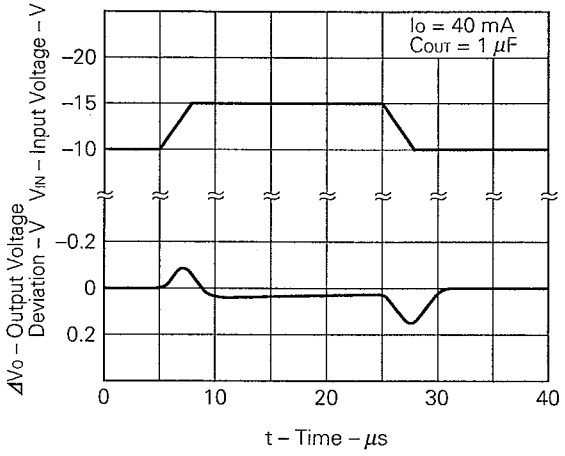
I_{Opeak} – (V_{IN} – V_O)



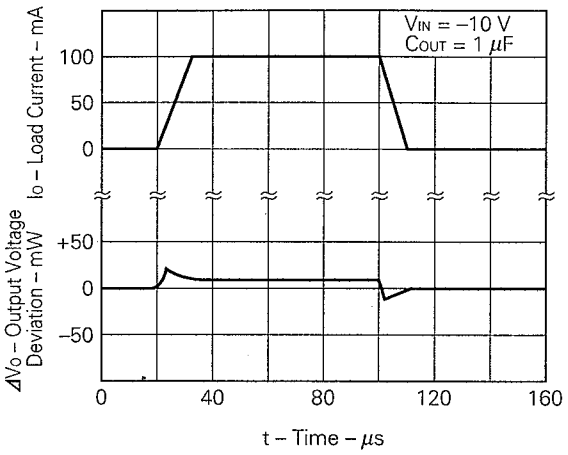
R_O – f (μPC79L05)



LINE TRANSIENT RESPONSE (μPC79L05)

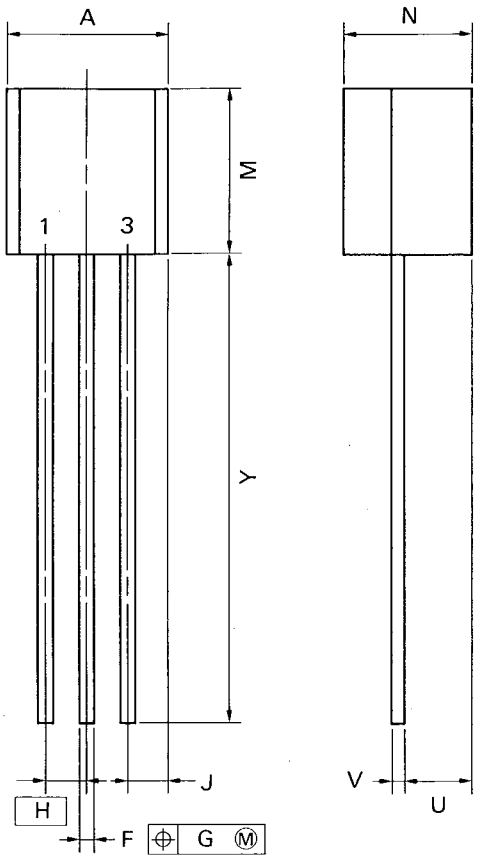


LOAD TRANSIENT RESPONSE (μPC79L05)



PACKAGE DIMENSIONS (Unit: mm)

3 PIN PLASTIC SIP (TO-92)



P3J-127B

NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	5.2 MAX.	0.205 MAX.
F	$0.5^{+0.3}_{-0.1}$	$0.02^{+0.012}_{-0.005}$
G	0.12	0.005
H	1.27	0.05
J	1.33 MAX.	0.053 MAX.
M	5.5 MAX.	0.217 MAX.
N	4.2 MAX.	0.166 MAX.
U	2.8 MAX.	0.111 MAX.
V	$0.5^{\pm 0.1}$	$0.02^{+0.004}_{-0.005}$
Y	$15.0^{\pm 0.7}$	$0.591^{+0.028}_{-0.029}$

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.
Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

TYPES OF THROUGH HOLE MOUNT DEVICE

μPC79L00J Series

Soldering process	Soldering conditions	Symbol
Wave soldering	Solder temperature: 260 °C or below. Flow time: 10 seconds or below.	

Reference

Application note name	No.
Quality control of NEC semiconductor devices	TEI-1202
Quality control guide of semiconductor devices	MEI-1202
Assembly manual of semiconductor devices	IEI-1207
NEC semiconductor device reliability/quality control system	IEI-1212

[MEMO]

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