To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Not recommend for new design

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

Send any inquiries to http://www.renesas.com/inquiry.

Downloaded from Arrow.com.

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.

   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.

   "Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

Not recommend for new design

Downloaded from Arrow.com.

DATA SHEET

RENESAS

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC1094

SWITCHING REGULATOR CONTROL CIRCUIT FOR 500 kHz OPERATION

DESCRIPTION

μPC1094C, μPC1094G are PWM type switching regulator control circuit up to 500 kHz switching frequency.

These devices feature low standby current, totem pole output circuit which can directly drive the gate of power MOS FET at high speed, and various protection circuits.

These devices are optimum choise for the single ended primary control method switching regulator.

Not recommend for new design

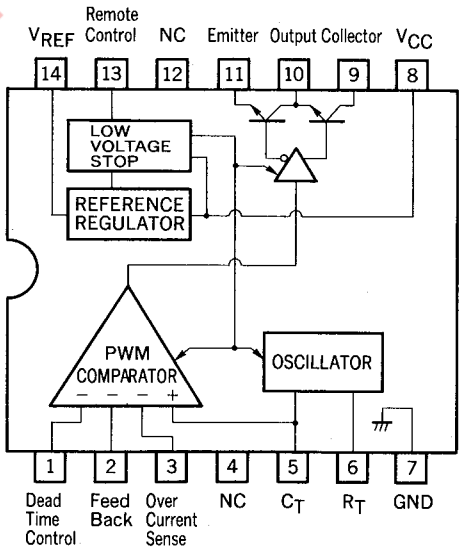
FEATURES

- Directly switching the gate of an external power MOS FET at high speed. ($I_{C(peak)}$ = 1.2 A)
- Low supply current.
- Internal low voltage stop circuit.
- Internal ON/OFF control circuit.
- Over current sense pin appendant.
- Capable of master slave operation.

ORDERING INFORMATION

Part Number	Package
μPC1094C	14-PIN PLASTIC DIP (300 mil)
μPC1094G	14-PIN PLASTIC SOP (225 mil)

CONNECTION DIAGRAM (Top View)



NEC cannot assume any responsibility for any circuits shown or represent that they are free from patent infringement.

© NEC Corporation 1989

Downloaded from Arrow.com.

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

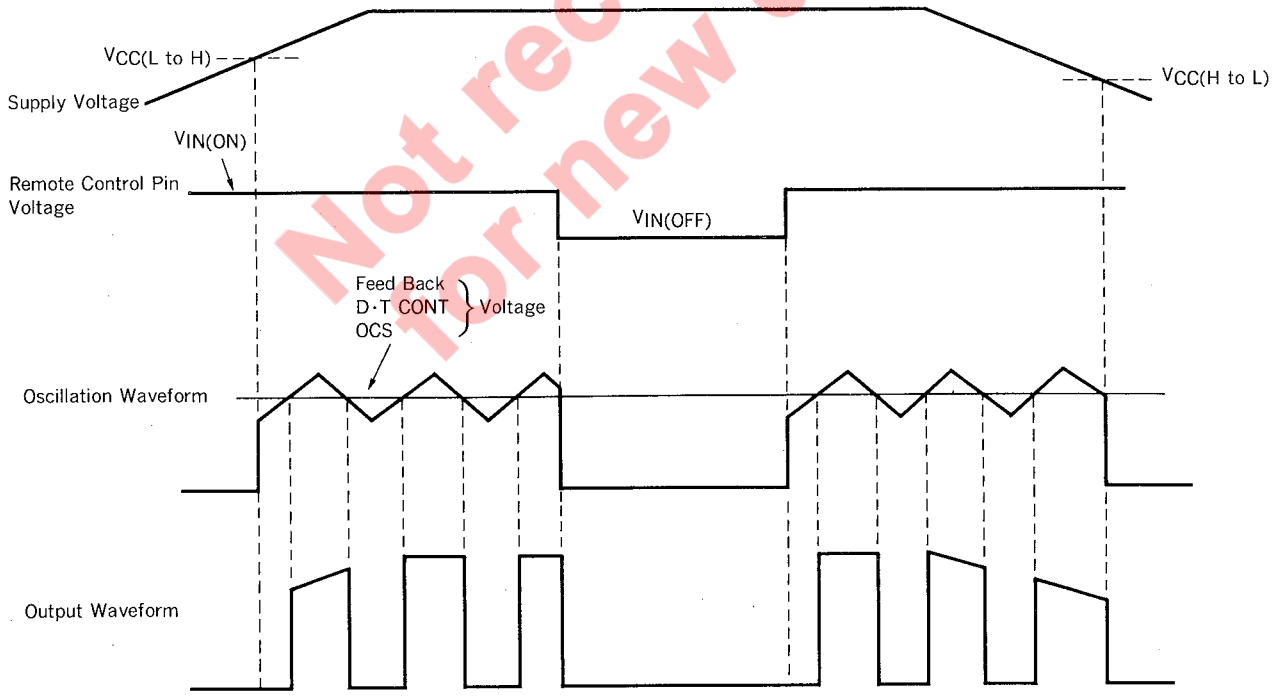
Supply Voltage		V_{CC}	26	V
Output Voltage		V_C	26	V
Output Current (DC)		$I_{C(DC)}$	100	mA
Output Current (Peak)		$I_{C(peak)}$	1.2	A
Total Power Dissipation	μPC1094C	P_T	570	mW
	μPC1094G	P_T	550	mW
Operating Temperature Range		T_{opt}	−20 to +85	°C
Storage Temperature Range		T_{stg}	−55 to +150	°C

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	11	15	24	V
Oscillation Frequency	f_{osc}	50	200	500	kHz
Output Load Capacitance	C_L		2 200	3 000	pF

Not recommend for new design

OPERATING WAVEFORM



Downloaded from Arrow.com.

ELECTRICAL CHARACTERISTICS (T_a = 25 °C, V_{CC} = 15 V, R_T ≒ 36 kΩ, C_T = 1 000 pF, f_{osc} = 200 kHz)

BLOCK	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
	Stand-by Current	$I_{CC(SB)}$		0.9	1.6	mA	V_{CC} = 8 V, −10 °C ≦ T_a ≦ +85 °C
	Circuit Current	I_{CC}		6	10	mA	V_{CC} = V_C = 20 V, V_D = 2.15 V No Load *1
Low Voltage Stop Circuit	Start-up Voltage	$V_{CC(LtoH)}$	9.6	10.3	11	V	
	Hysteresis Voltage	V_H	1.8	2.0	2.2	V	
Reference Voltage Circuit	Reference Voltage	V_{REF}	4.75	5.0	5.25	V	I_{REF} = 0
	Line Regulation	REG_{IN}		1	10	mV	11 V ≦ V_{CC} ≦ 20 V, I_{REF} = 0
	Load Regulation	REG_L		6.5	12	mV	0 ≦ I_{REF} ≦ 3 mA
	Temperature Coefficient	$\Delta V_{REF}/\Delta T$		400	700	μV/°C	I_{REF} = 0, −10 °C ≦ T_a ≦ +85 °C
	Short Circuit Current	I_{short}		13		mA	V_{REF} = 0
PWM Circuit	Input Bias Current	I_B			10	μA	
	Low Level Threshold Voltage	$V_{TH(L)}$		1.6		V	
	High Level Threshold Voltage	$V_{TH(H)}$		2.5		V	
	Dead Time Temperature Coefficient			3		%	V_D = 0.43 V_{REF}, −10 °C ≦ T_a ≦ +85 °C
Oscillator Circuit	Oscillation Frequency	f_{osc}	180	200	220	kHz	
	Frequency Line Regulation	$\Delta f/\Delta V$		1		%	11 V ≦ V_{CC} ≦ 20 V
	Frequency Temperature Coefficient	$\Delta f/\Delta T$		2	5	%	−10 °C ≦ T_a ≦ +85 °C
Output Circuit	Low Level Output Voltage	V_{OL}			0.5	V	I_{SINK} = 3 mA *1
	High Level Output Voltage	V_{OH}		V_{CC}−1.6		V	I_{SOURCE} = 30 mA *1
	Output Voltage Rise Time	t_r		60		ns	R_L = 15 Ω, C_L = 2 200 pF *1, *2
	Output Voltage Fall Time	t_f		40		ns	
Remote Control Circuit	Input Voltage (ON)	$V_{IN(ON)}$			2.4	V	
	Input Voltage (OFF)	$V_{IN(OFF)}$	0.5			V	

*1 V_{CC} — Collector (pin 9) connection, GND — Emitter (pin 11) connection

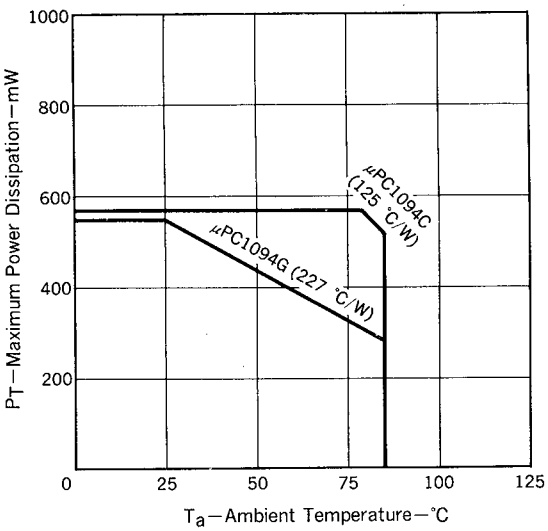
*2 R_L: Load Resistance C_L: Load Capacitance

Not recommend for new design

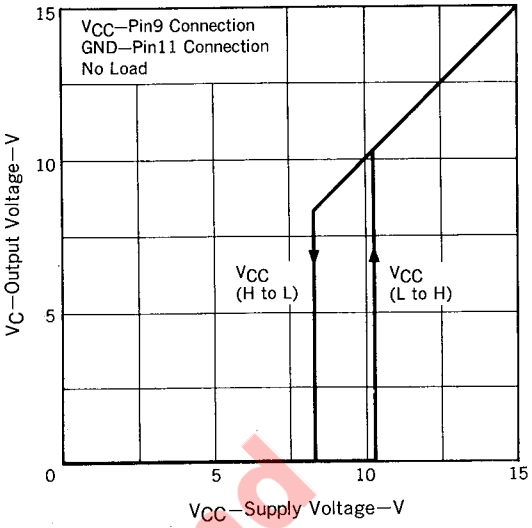
Downloaded from Arrow.com.

TYPICAL CHARACTERISTICS (T_a = 25 °C, V_{CC} = 15 V)

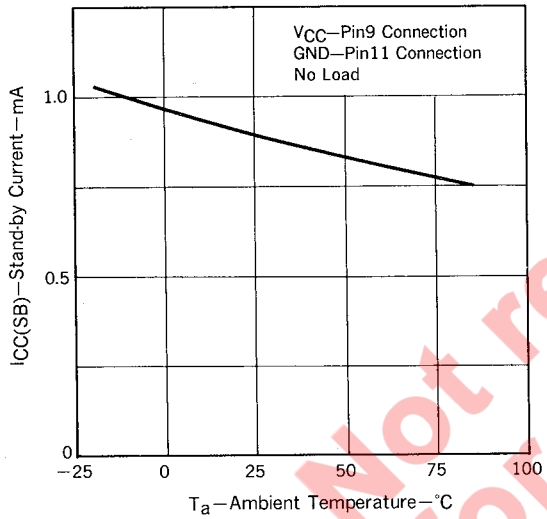
MAXIMUM POWER DISSIPATION vs. AMBIENT TEMPERATURE



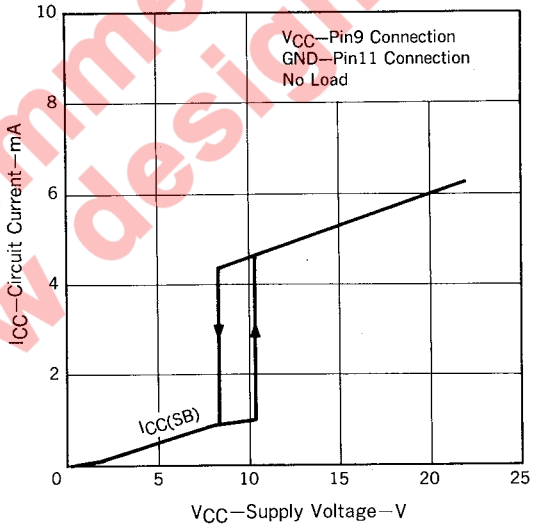
LOW VOLTAGE STOP CIRCUIT



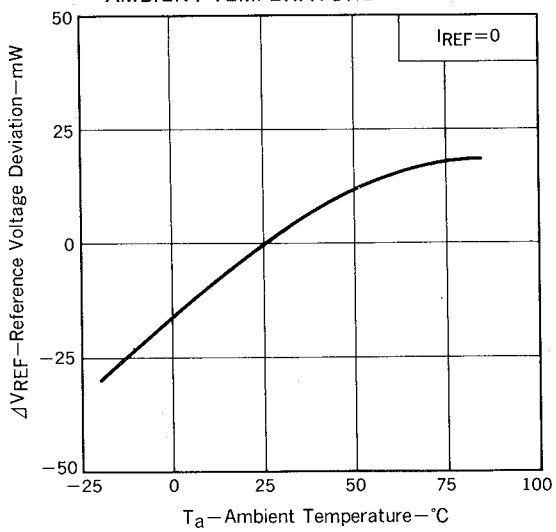
STAND-BY CURRENT vs. AMBIENT TEMPERATURE



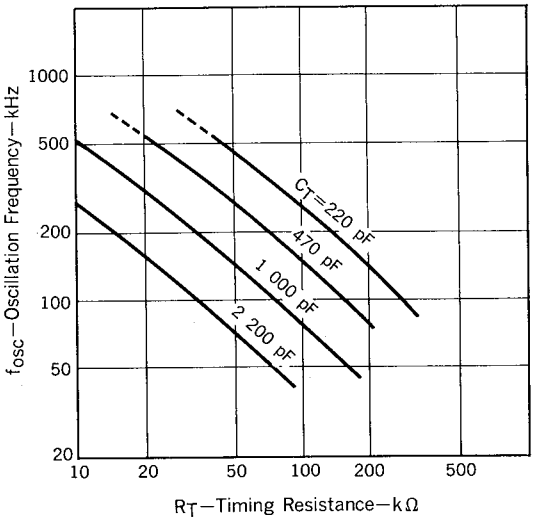
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



REFERENCE VOLTAGE DEVIATION vs. AMBIENT TEMPERATURE



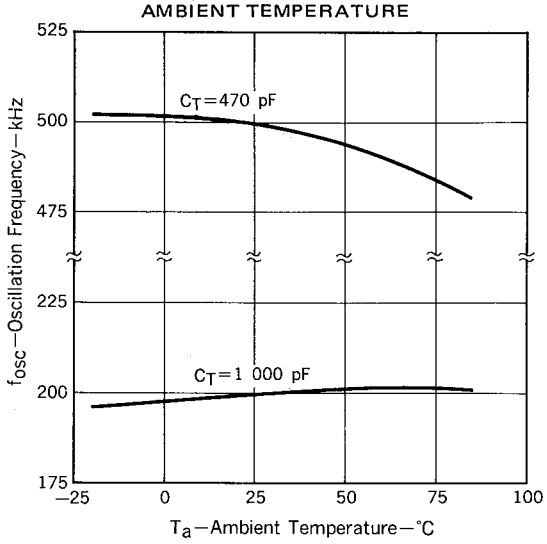
OSCILLATION FREQUENCY vs. TIMING RESISTANCE, CAPACITANCE



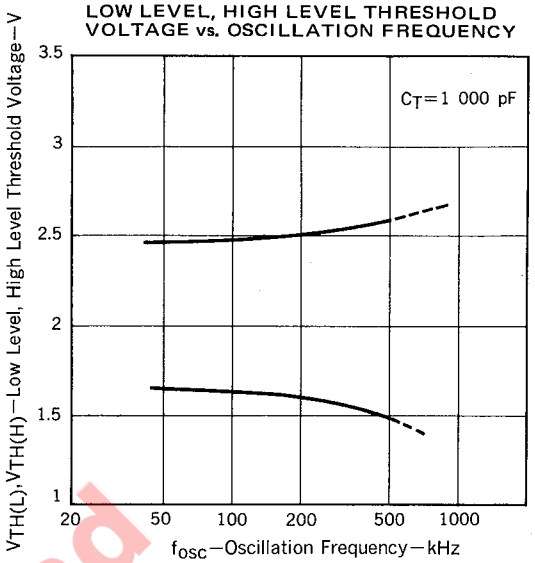
Not recommend for new design

Downloaded from Arrow.com.

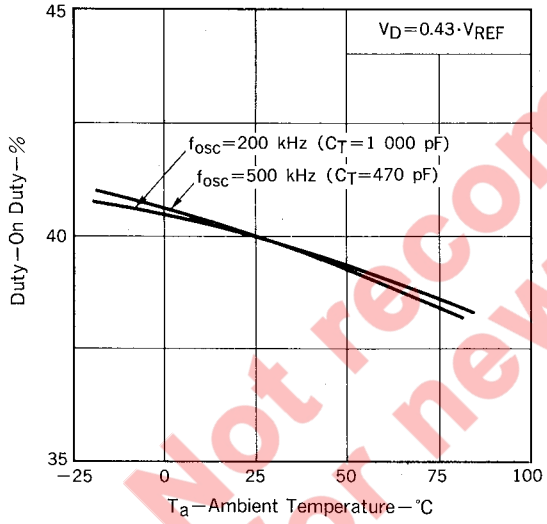
OSCILLATION FREQUENCY vs. AMBIENT TEMPERATURE



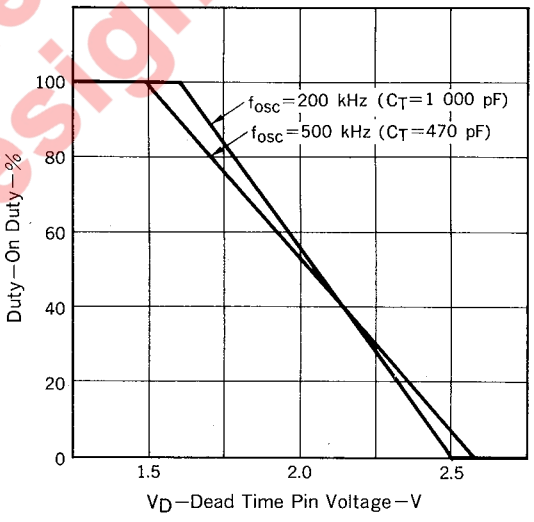
LOW LEVEL, HIGH LEVEL THRESHOLD VOLTAGE vs. OSCILLATION FREQUENCY



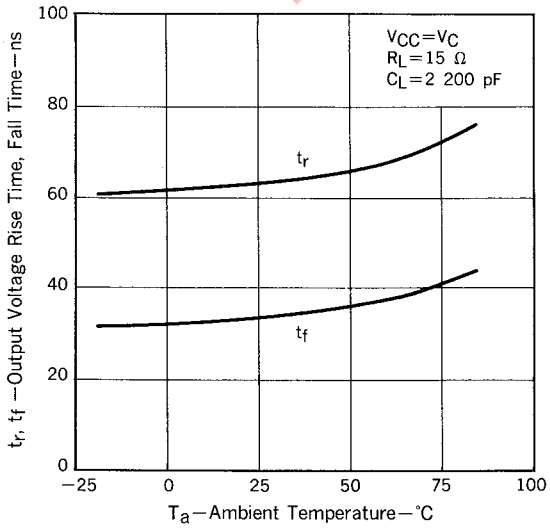
ON DUTY vs. AMBIENT TEMPERATURE



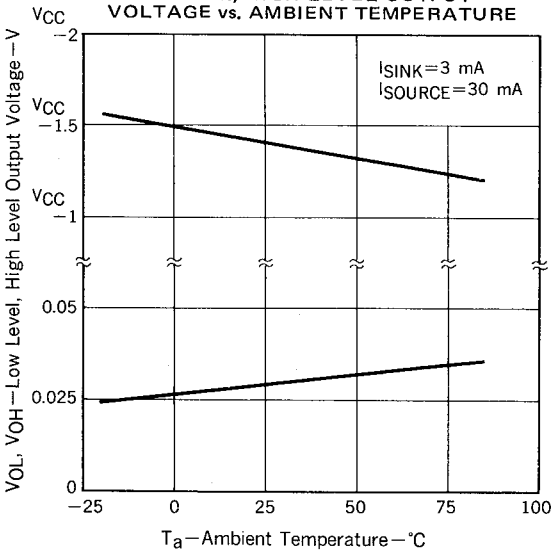
ON DUTY vs. DEAD TIME PIN VOLTAGE



OUTPUT VOLTAGE RISE TIME, FALL TIME vs. AMBIENT TEMPERATURE



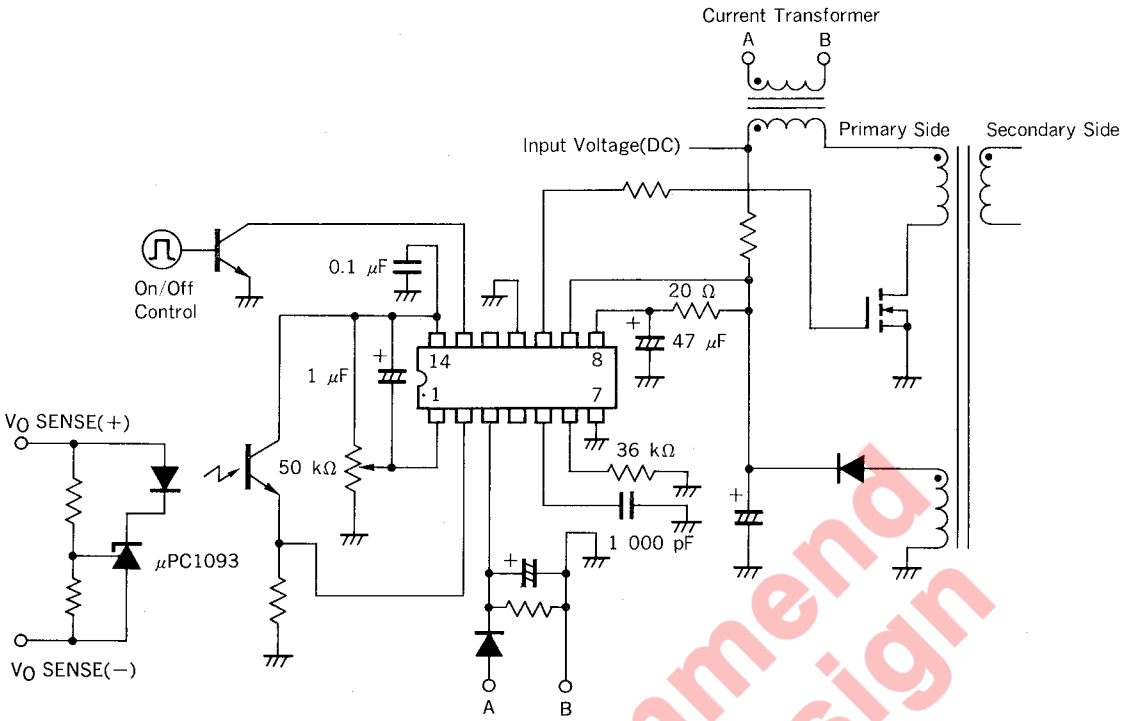
LOW LEVEL, HIGH LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



Not recommend for new design

Downloaded from Arrow.com.

TYPICAL APPLICATION

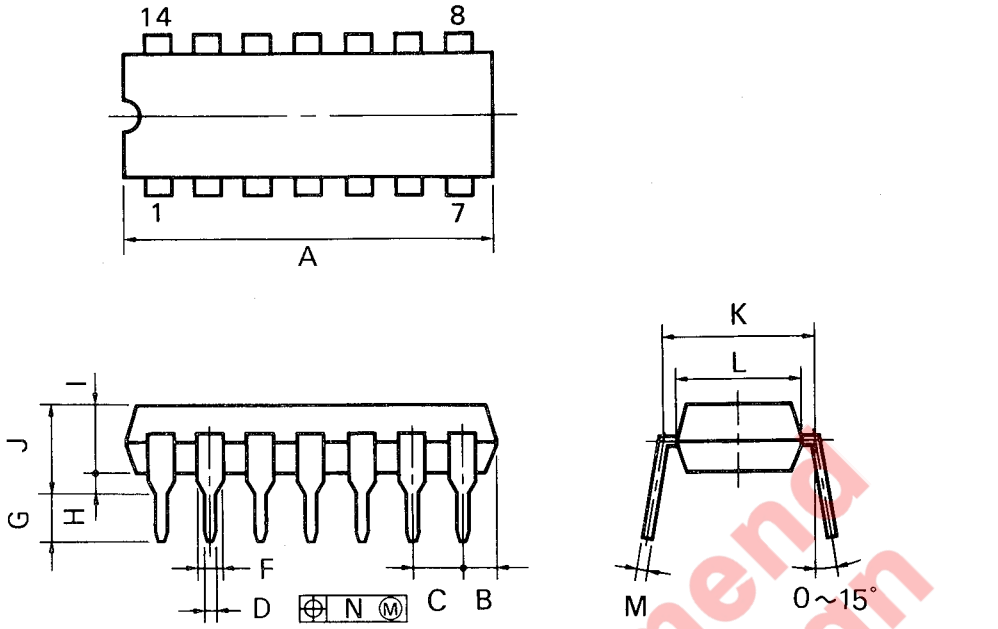


Not recommend for new design

Downloaded from Arrow.com.

14-Pin Plastic DIP (300 mil)

(C Package)



P14C-100-300B1

NOTES

1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

2) Item "K" to center of leads when formed parallel.

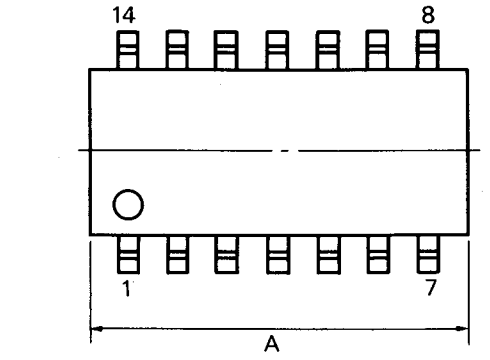
ITEM	MILLIMETERS	INCHES
A	20.32 MAX.	0.800 MAX.
B	2.54 MAX.	0.100 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
D	$0.50^{\pm 0.10}$	$0.020^{+0.004}_{-0.005}$
F	1.2 MIN.	0.047 MIN.
G	$3.6^{\pm 0.3}$	$0.142^{\pm 0.012}$
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.08 MAX.	0.200 MAX.
K	7.62 (T.P.)	0.300 (T.P.)
L	6.4	0.252
M	$0.25^{+0.10}_{-0.05}$	$0.010^{+0.004}_{-0.003}$
N	0.25	0.01

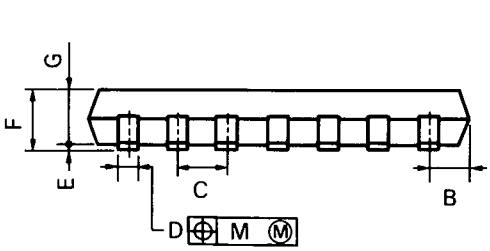
Not recommend for new design

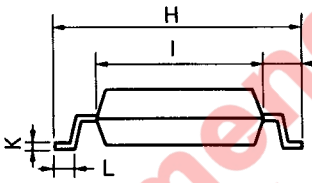
Downloaded from Arrow.com.

14-Pin Plastic SOP (225 mil)

(G Package)







S14GM-50-225B, C

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	10.46 MAX.	0.412 MAX.
B	1.42 MAX.	0.056 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	$0.40^{+0.10}_{-0.05}$	$0.016^{+0.004}_{-0.003}$
E	0.1 ± 0.1	0.004 ± 0.004
F	1.8 MAX.	0.071 MAX.
G	1.49	0.059
H	6.5 ± 0.3	0.256 ± 0.012
I	4.4	0.173
J	1.1	0.043
K	$0.15^{+0.10}_{-0.05}$	$0.006^{+0.004}_{-0.002}$
L	0.6 ± 0.2	$0.024^{+0.008}_{-0.009}$
M	0.12	0.005

Not recommend for new design

IC–1862
January 1989M
Printed in Japan

Downloaded from Arrow.com.