

## 4-Channel Supervisor IC for Power Supply

### Features

- Over-voltage protection and lockout for 3.3V, 5V, and two 12V power supplies
- Under-voltage protection and lockout for 3.3V, 5V, and two 12V power supplies
- Over-current protection and lockout for 3.3V, 5V and 12V power supplies
- Open drain output for PGO and FPO/ pins
- 300mS power good delay
- 75mS delay for under-voltage and over-current protection
- 38mS for PSON/ de-bounce
- 73uS width noise de-glitches
- Wide power supply voltage range
- Special care for AC power off

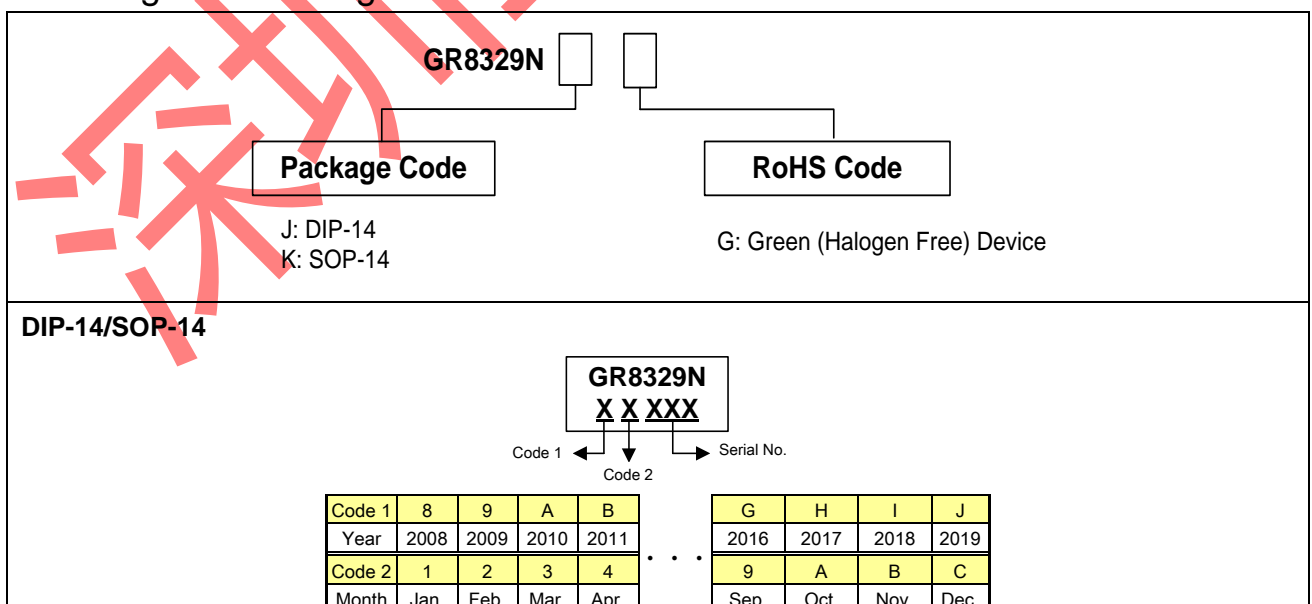
### Applications

- PC power supply
- LCD TV power supply

### Description

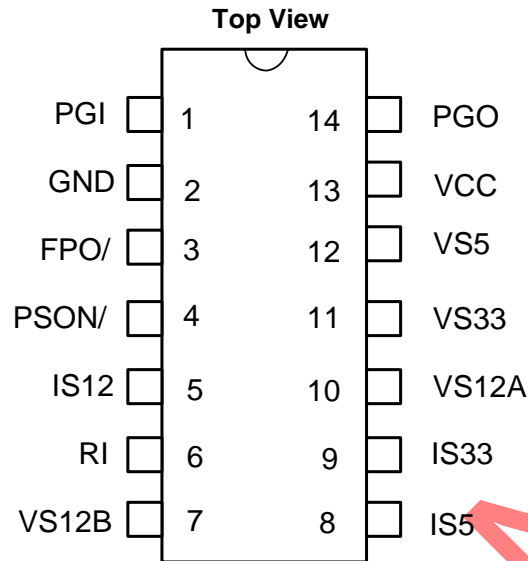
The GR8329N is designed to monitor the outputs of switching power supply and generates the power good signal to inform the system. It provides over-voltage protection, under-voltage protection, over-current protection, and power good signal generating. The over-voltage protection (OVP) and under-voltage protection (UVP) monitor 3.3V, 5V and two 12V to protect the power supply and system. Over-current protection (OCP) monitors IS33, IS5, IS12 input current sense. An adjustable over-current trip point composed of Iref and a setting resistor help users design the OCP easily. The power-good feature issues a power-good signal when the output is ready; therefore, the GR8329N provides a reliable power supply environment for the system.

### Ordering and Marking Information



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## Pin Configuration



## Pin Descriptions

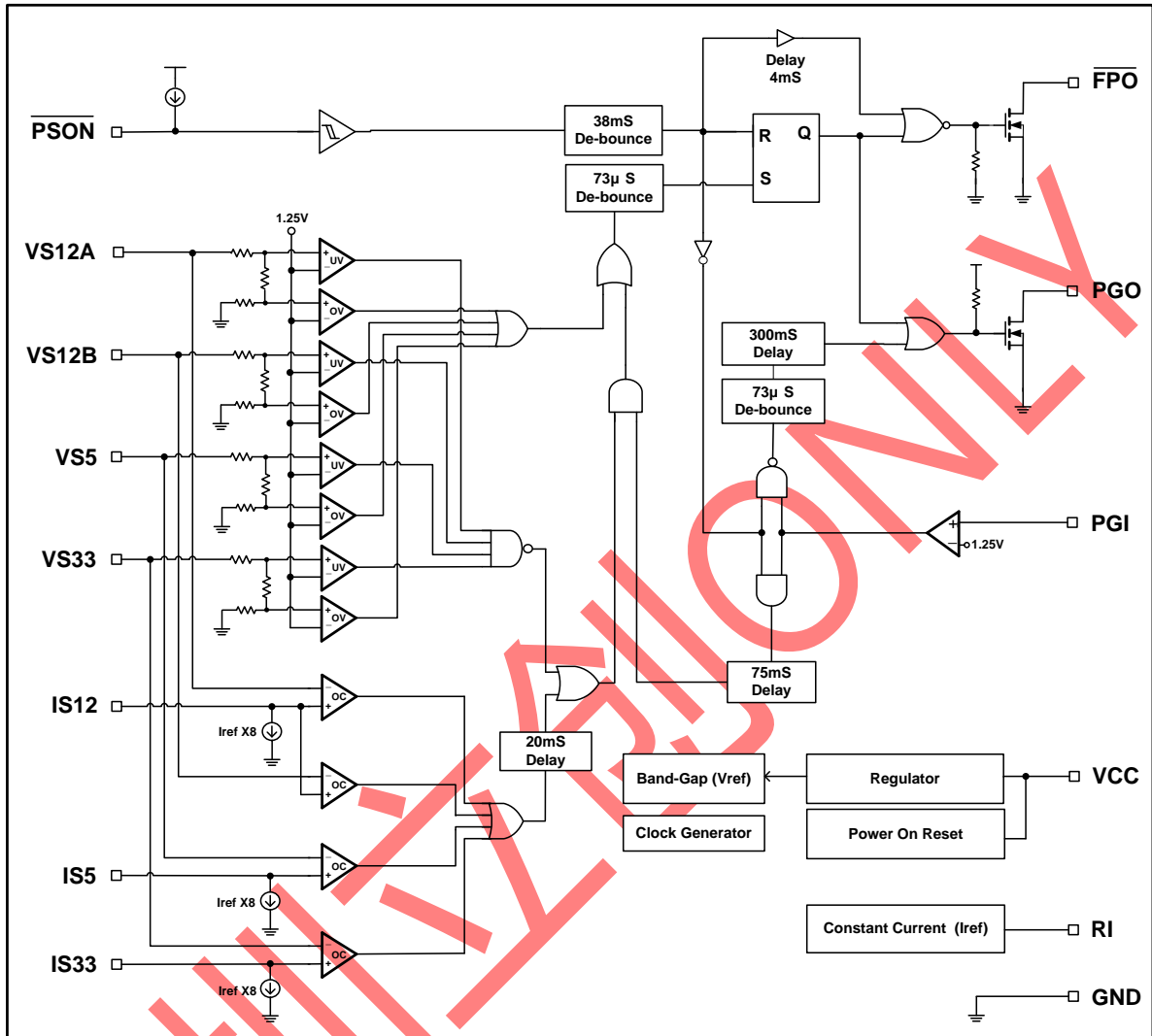
Pin No	Name	I/O	Description
1	PGI	I	Power good input pin
2	GND		Ground
3	FPO/	O	Fault protection output pin, open drain output
4	PSON/	I	ON/OFF control input pin
5	IS12	I	12V over-current protection sense input
6	RI	I	Reference current setting adjust input
7	VS12B	I	12V over/under-voltage sense input
8	IS5	I	5V over-current protection sense input
9	IS33	I	3.3V over-current protection sense input
10	VS12A	I	12V over/under-voltage sense input
11	VS33	I	3.3V over/under-voltage sense input
12	VS5	I	5V over/under-voltage sense input
13	VCC	I	Power supply
14	PGO	O	Power good output signal pin, open drain output

### Absolute Maximum Ratings

VCC, VS12A/B, IS12, PGI, FPO/	-----	-0.5 ~ 16V
VS5, IS5	-----	-0.5 ~ 9V
VS33, IS33	-----	-0.5 ~ 7V
PSON/, PGO	-----	-0.5 ~ VCC + 0.5V
Junction temperature	-----	150°C
Operating ambient temperature	-----	-20°C ~ 85°C
Storage temperature range	-----	-65°C ~ 150°C
DIP-14 package thermal resistance	-----	100°C/W
Power dissipation (DIP-14, at ambient temperature = 85°C)	-----	650mW
Lead temperature (All Pb free packages, soldering, 10 sec)	-----	260°C
ESD voltage protection, human body model	-----	3KV
ESD voltage protection, machine model	-----	250V

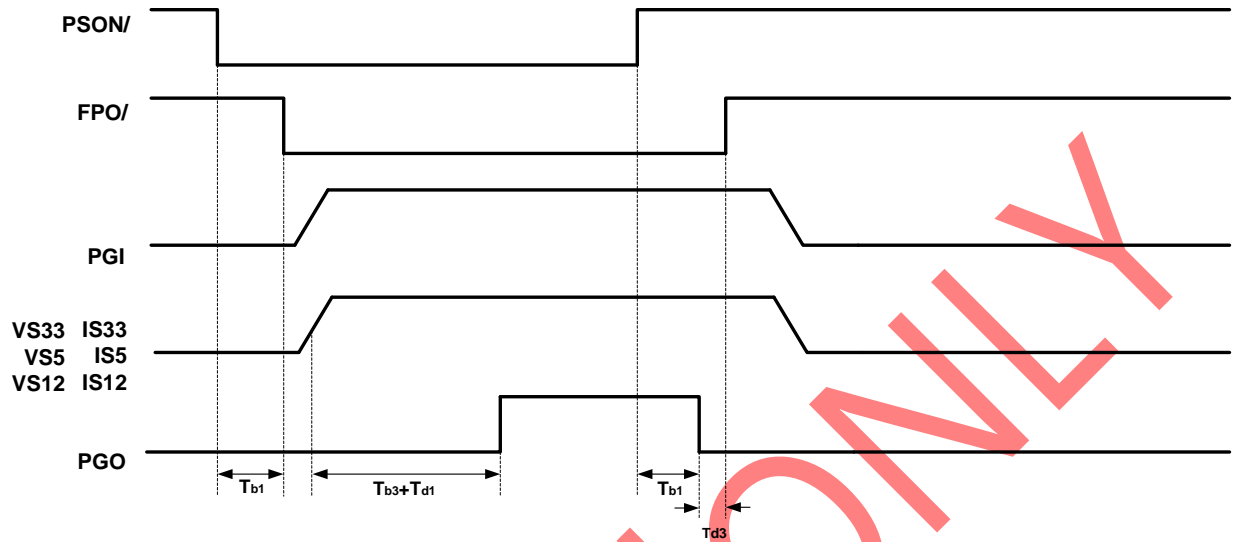
### Recommended Operating Conditions

Item	Min.	Max.	Unit
Supply voltage VCC	5	15	V
OCP sense resistor	2		mΩ

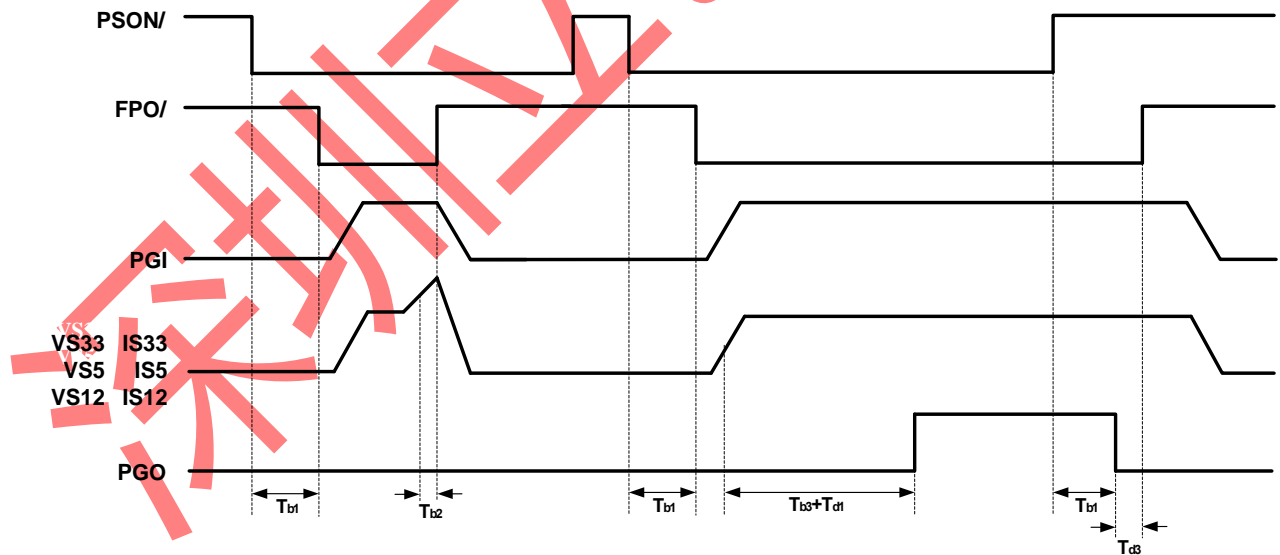
**Block Diagram**


## Timing Chart

### 1. PSON/ Signal Characteristics

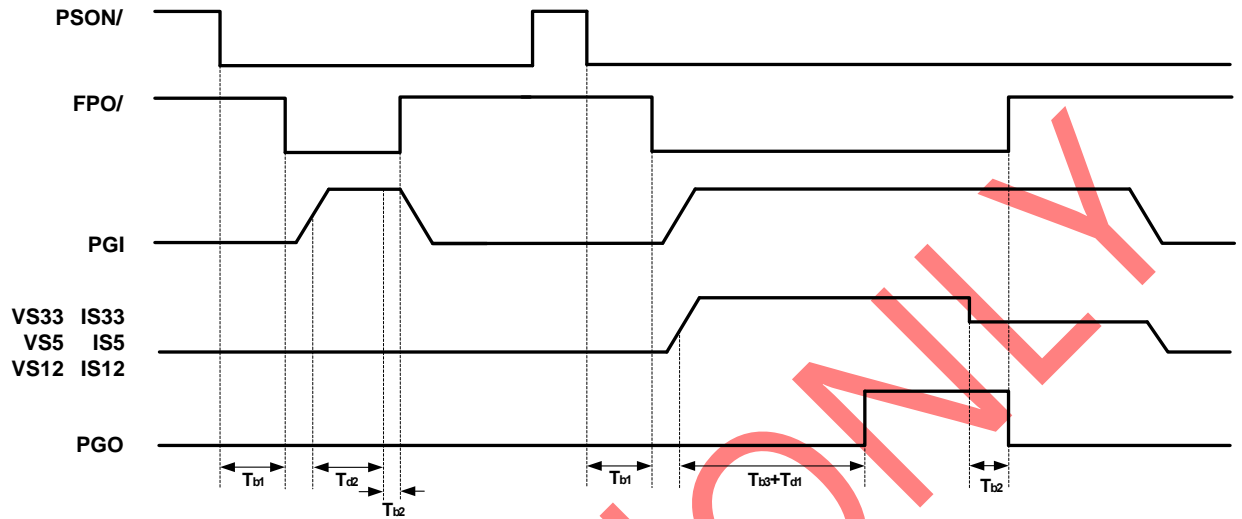


### 2. Over-voltage and Over-current Characteristics

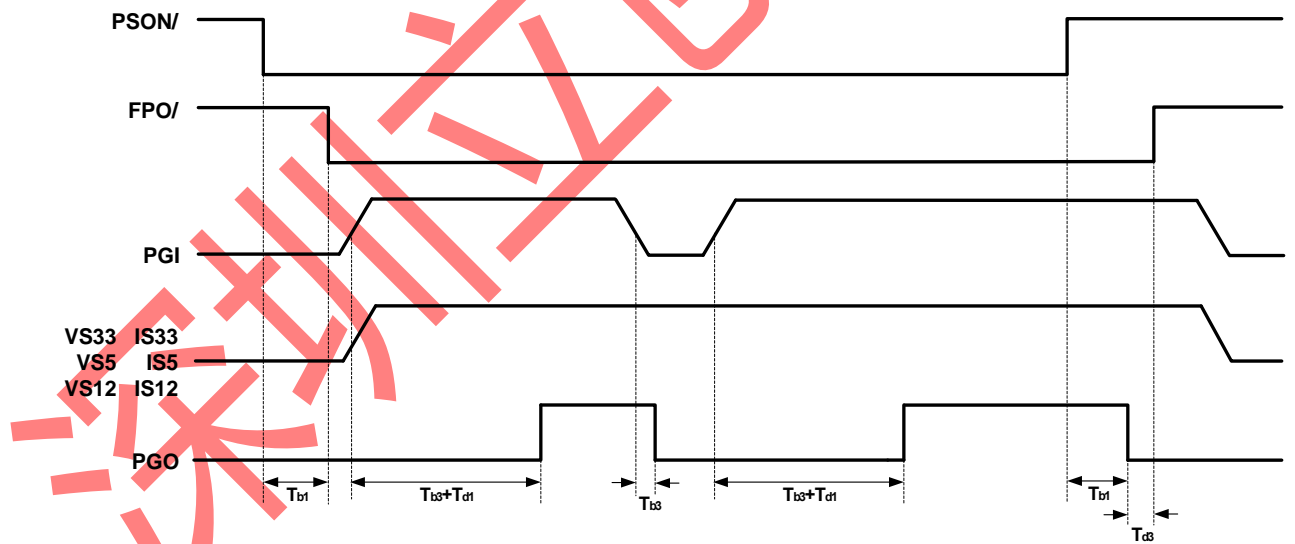


## Timing Chart (Cont.)

### 3. Under-voltage Characteristics



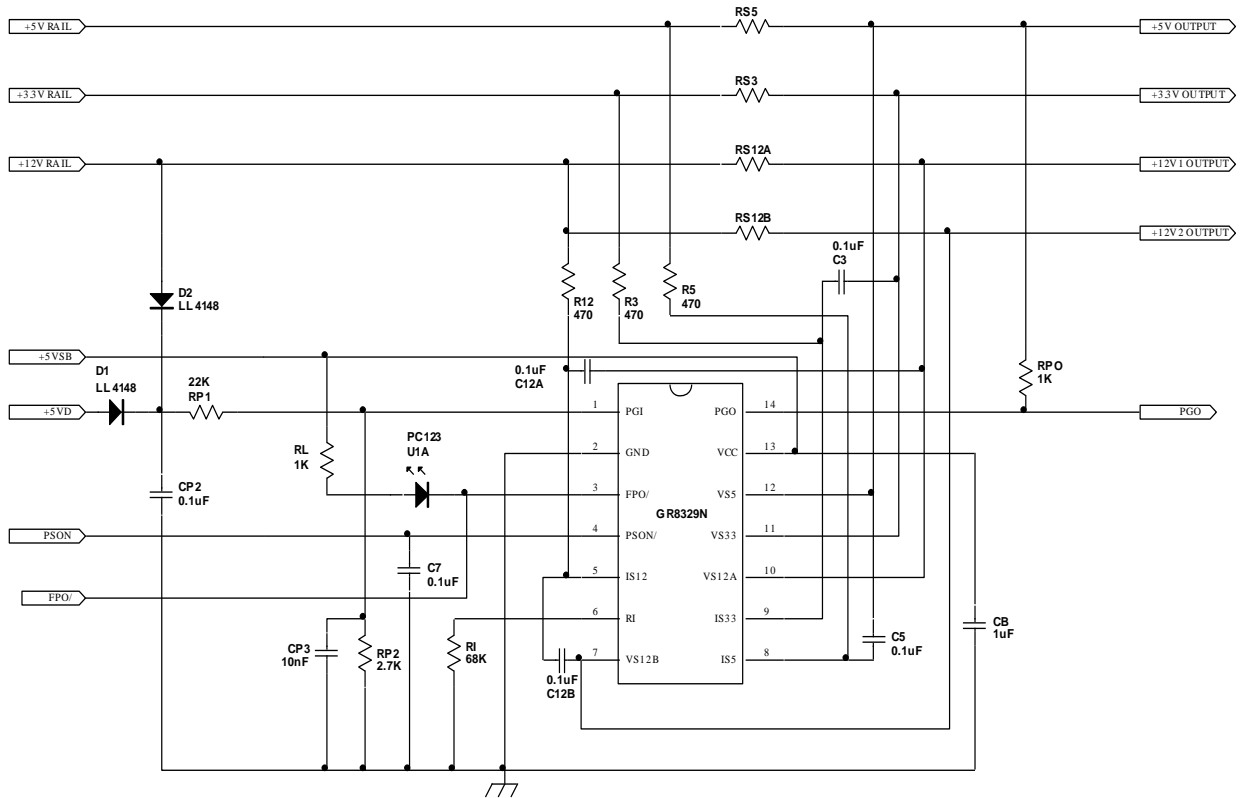
### 4. PGI Characteristics



**Electrical Characteristics** (VCC = 5V, Ta = 25°C, unless otherwise specified)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
<b>POWER SUPPLY</b>						
Supply voltage		VCC	4.0	5.0	16.0	V
Supply current	V <sub>PSON/</sub> = 5V	I <sub>vcc</sub>			1	mA
<b>OVER-VOLTAGE PROTECTION</b>						
Over-voltage threshold		VS33	3.7	3.9	4.1	V
		VS5	5.7	6.1	6.5	V
		VS12A/B	13.1	13.8	14.5	V
<b>UNDER-VOLTAGE PROTECTION</b>						
Under-voltage threshold		VS33	2.0	2.2	2.4	V
		VS5	3.3	3.5	3.7	V
		VS12A/B	8.5	9.0	9.5	V
<b>OVER-CURRENT PROTECTION</b>						
Constant current		I <sub>ref</sub>	12.5	20.0	62.5	uA
Ratio of IS sink current to I <sub>RI</sub>			7.6	8	8.4	
Offset voltage of OCP comparators		V <sub>offset</sub>	-3		3	mV
<b>PSON/</b>						
High-level input threshold voltage		V <sub>IH</sub>	1.4	1.5		V
Low-level input threshold voltage		V <sub>IL</sub>		1.0	1.1	V
<b>PGI AND PGO, FPO/</b>						
PGI threshold voltage		V <sub>PGI</sub>	1.16	1.25	1.33	V
Threshold voltage for Td2		V <sub>PGI,Td2</sub>	0.60	0.63	0.75	V
Threshold voltage for UV,OC		V <sub>PGI</sub>	1.05	1.13	1.21	V
PGI Hysteresis		V <sub>PGI</sub>	±20	±50	±80	mV
Leakage current (PGO)	V <sub>PG</sub> = 5V	I <sub>LKG</sub>			5	uA
Low level output voltage (PGO)	I <sub>SINK</sub> = 10mA	V <sub>OL</sub>			0.35	V
Leakage current (FPO/)	V <sub>FPO/</sub> = 5V	I <sub>LKG</sub>			5	uA
Low level output voltage(FPO/)	I <sub>SINK</sub> = 10mA	V <sub>OL</sub>			0.35	V
<b>SWITCHING CHARACTERISTICS</b>						
PSON/ de-bounce time		Tb1	24	38	61	mS
FPO/ noise de-glitch time		Tb2	47	73	110	uS
PGO noise de-glitch time		Tb3	47	73	110	uS
PGI to PGO delay time		Td1	200	300	480	mS
UVP/OCP protection delay time		Td2	49	75	114	mS
PGO to FPO/ delay time		Td3	2	4	6	mS

## Typical Application Circuit



## Application Information

- The GR8329N provides over-current protection (OCP) for the 3.3V, 5V, and two 12V rails. Whenever an OCP condition occurs, the FPO/ output goes high and PGO goes low. Here is an OCP design example:

Suppose the OCP trig point set on 20A,

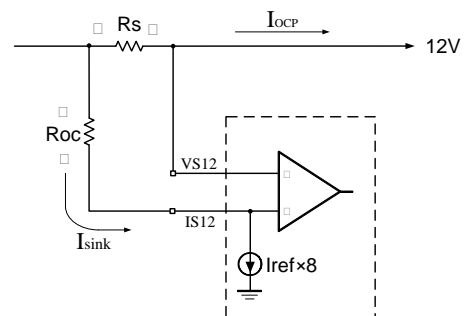
When OCP occurs,  $I_{ocp} * R_s = I_{sink} * R_{oc}$ ,

Select  $R_s = 2m\Omega$ ,  $R_I = 62.5K\Omega$ ,

Then  $I_{sink} = (1.25V/R_I) * 8 = 160\mu A$ .

Thus,

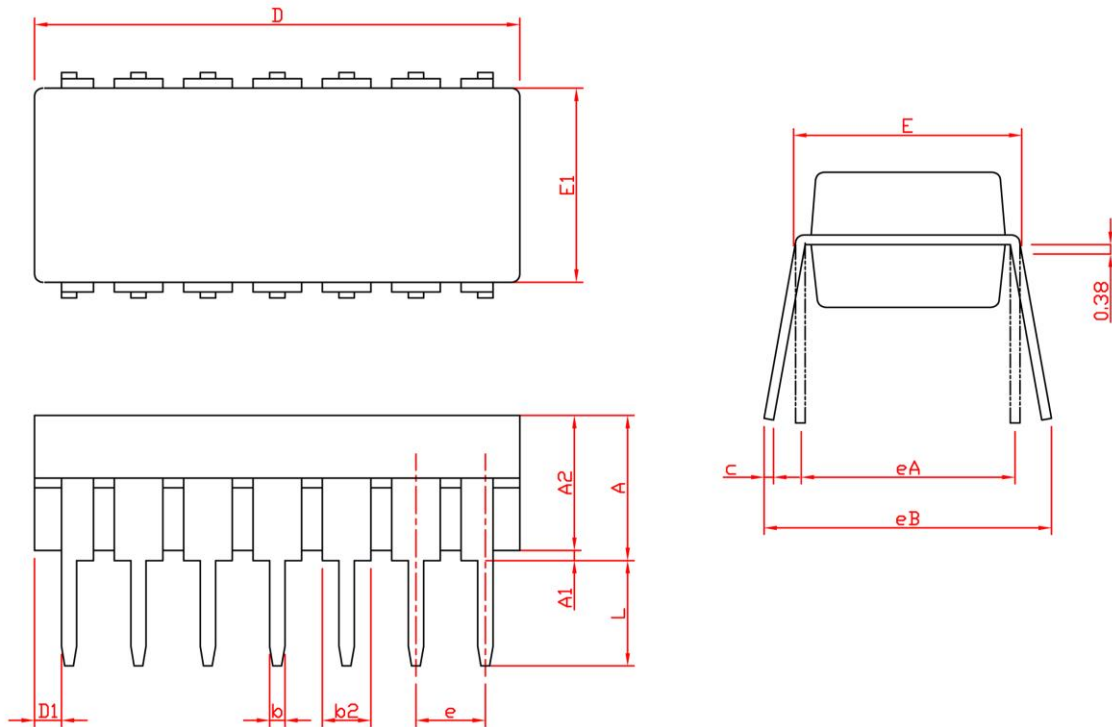
$R_{oc} = 20A * 2m\Omega / 160\mu A = 250\Omega$



The recommend sense resistor values of RS12A, RS12B, RS5, and RS3 are  $\geq 0.002\Omega$  for good accuracy and enough SNR.

- The power supply bypass capacitor CB suggests to be 0.1uF~ 10uF and layout nearby the pin VCC and GND. The other bypass capacitors for OCP or other input and output function pin suggests to be 0.01uF~1uF.

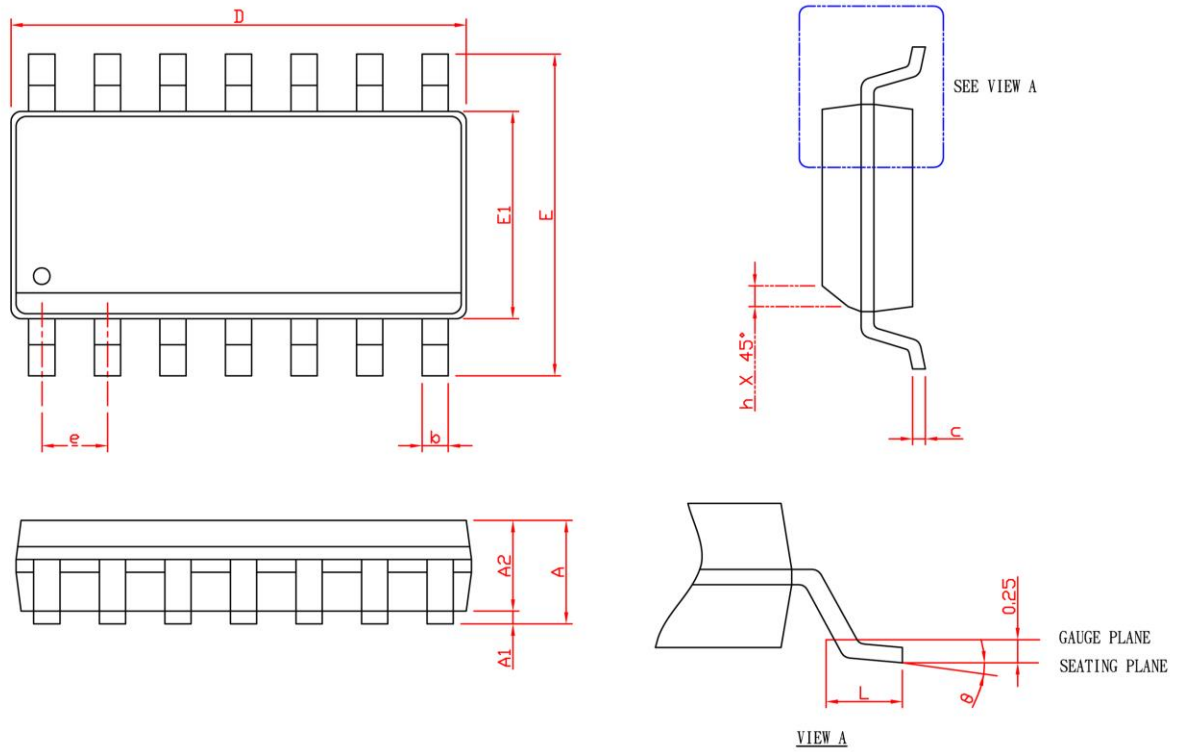


**Package Information**


SYMBOL	DIP-14			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		5.33		0.210
A1	0.38		0.015	
A2	2.92	4.95	0.115	0.195
b	0.36	0.56	0.014	0.022
b2	1.14	1.78	0.045	0.070
c	0.20	0.35	0.008	0.014
D	18.6	20.31	0.732	0.800
D1	0.13		0.005	
E	7.62	8.26	0.300	0.325
E1	6.10	7.11	0.240	0.280
e	2.54 BSC		0.100 BSC	
eA	7.62 BSC		0.300 BSC	
eB		10.92		0.430
L	2.92	3.81	0.115	0.150

Note : 1. Followed from JEDEC MS-001AA

2. Dimension D, D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 10 mil.

**Package Information**


SYMBOL	SOP-14			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.75		0.069
A1	0.10	0.25	0.004	0.010
A2	1.25		0.049	
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	8.55	8.75	0.337	0.344
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

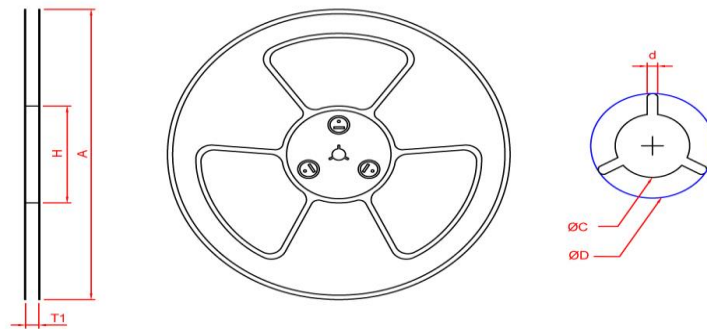
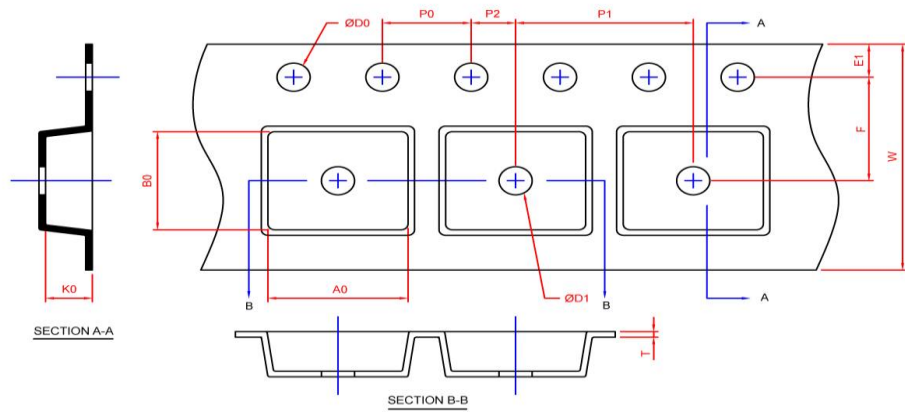
Note: 1. Followed from JEDEC MS-012 AB.

2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.

3. Dimension "E1" does not include inter-lead flash or protrusions. Inter-lead flash and protrusions shall not exceed 10 mil per side.

## Carrier Tape & Reel Dimensions

### SOP-14



Application	A	H	T1	C	d	D	W	E1	F
SOP-14	330.0±2.0	100 REF	1.4	13.0 + 0.5 - 0.2	2.0±0.5	16.5 REF	16.0±0.2	1.75±0.1	7.5±0.1
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0±0.1	8.0±0.1	2.0±0.1	1.5+0.10 -0.00	1.5 MIN.	0.3±0.05	6.5±0.1	9.5±0.1	2.1±0.1

(mm)

Application	Devices Per Reel
SOP-14	2500

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