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 two 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
- Programmable protection circuit
- Brown-in auto recovery

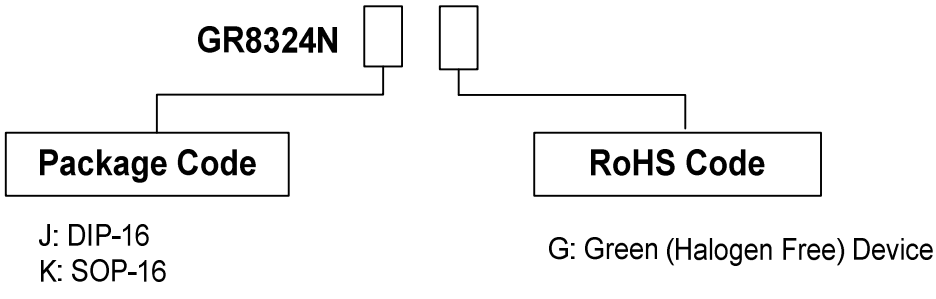
Applications

- PC power Supply
- LCD TV power Supply

Description

The GR8324N 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, IS12A, IS12B 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 GR8324N provides a reliable power supply environment for the system.

Ordering and Marking Information



DIP-16	SOP-16
GR8324N XXXXX	GR8324N XXXXX
XXXXX– Date Code	**XXXXX – Date Code**

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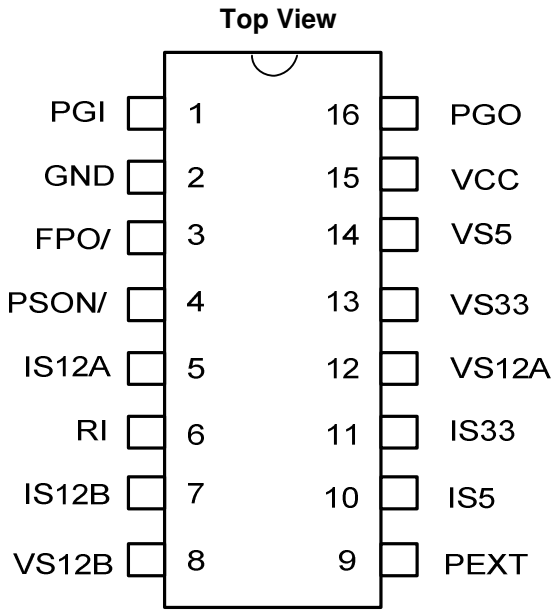
Pin Configuration



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	IS12A	I	12V over-current protection sense input
6	RI	I	Reference current setting adjust input
7	IS12B	I	12V over-current protection sense input
8	VS12B	I	12V over/under-voltage sense input
9	PEXT	I	External protection sense input
10	IS5	I	5V over-current protection sense input
11	IS33	I	3.3V over-current protection sense input
12	VS12A	I	12V over/under-voltage sense input
13	VS33	I	3.3V over/under-voltage sense input
14	VS5	I	5V over/under-voltage sense input
15	VCC	I	Power supply
16	PGO	O	Power good output signal pin, open drain output

Absolute Maximum Ratings

VCC, VS12A/B, IS12A/B, PGI, FPO/ ---------- -0.5 ~ 16V

VS5, IS5 ---------- -0.5 ~ 9V

VS33, IS33 ---------- -0.5 ~ 7V

PSON/, PEXT, PGO ---------- -0.5 ~ VCC + 0.5V

Junction temperature ---------- 150℃

Operating ambient temperature ---------- -20℃ ~ 85℃

Storage temperature range ---------- -65℃ ~ 150℃

DIP-16 package thermal resistance ---------- 100℃/W

Power dissipation (DIP-16, at ambient temperature = 85℃) ---------- 650mW

Lead temperature (All Pb free packages, soldering, 10 sec) ---------- 260℃

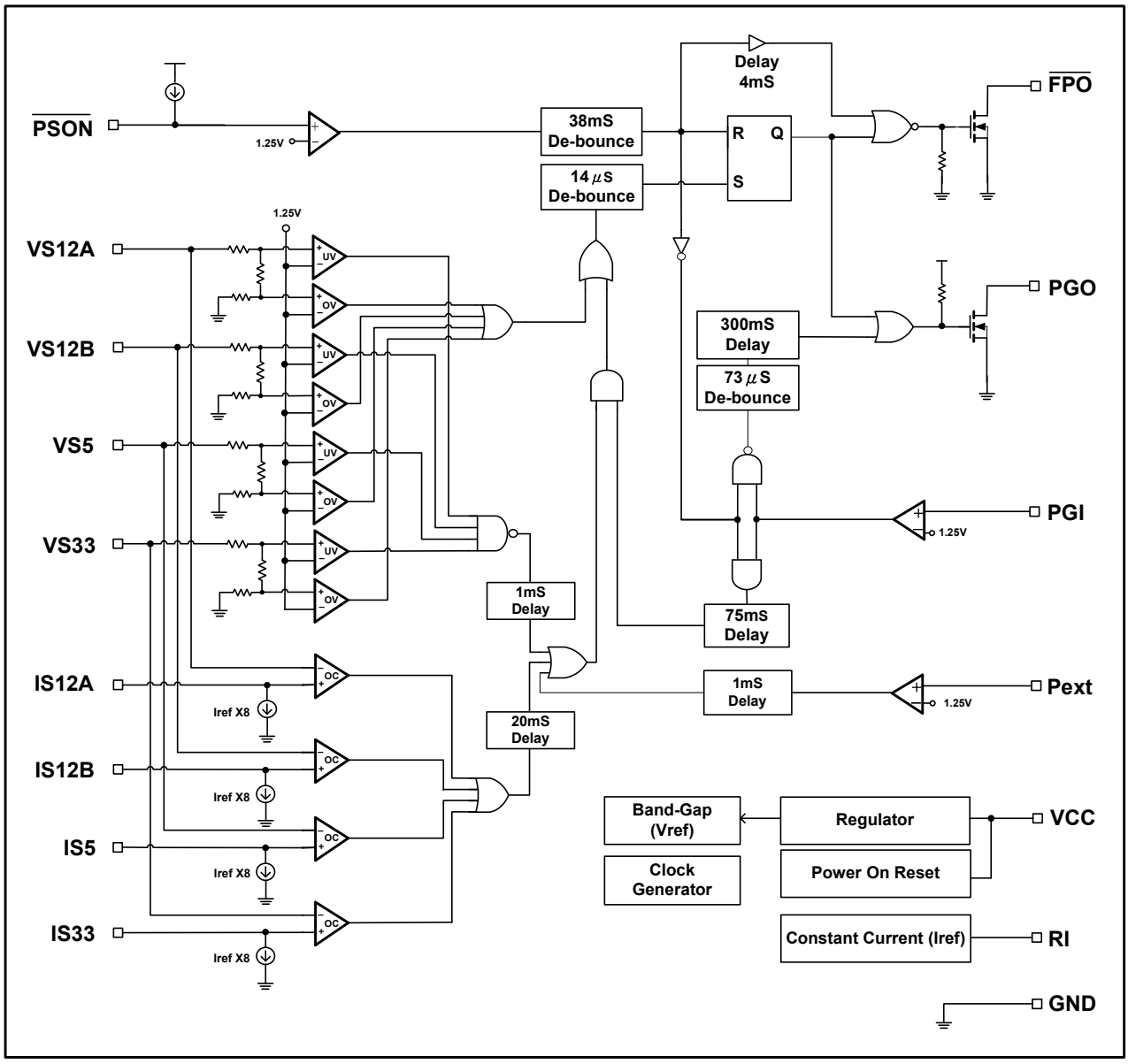
ESD voltage protection, human body model ---------- 3KV

ESD voltage protection, machine model ---------- 250V

Recommended Operating Conditions

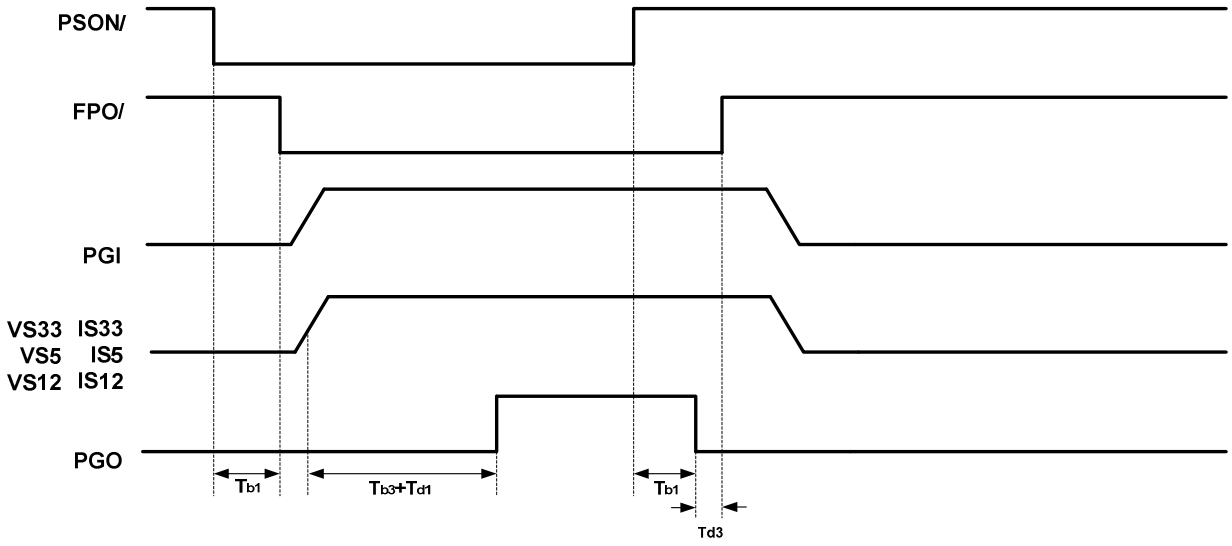
Item	Min.	Max.	Unit
Supply voltage VCC	5	15	V
OCP sense resistor	2		m Ω

Block Diagram

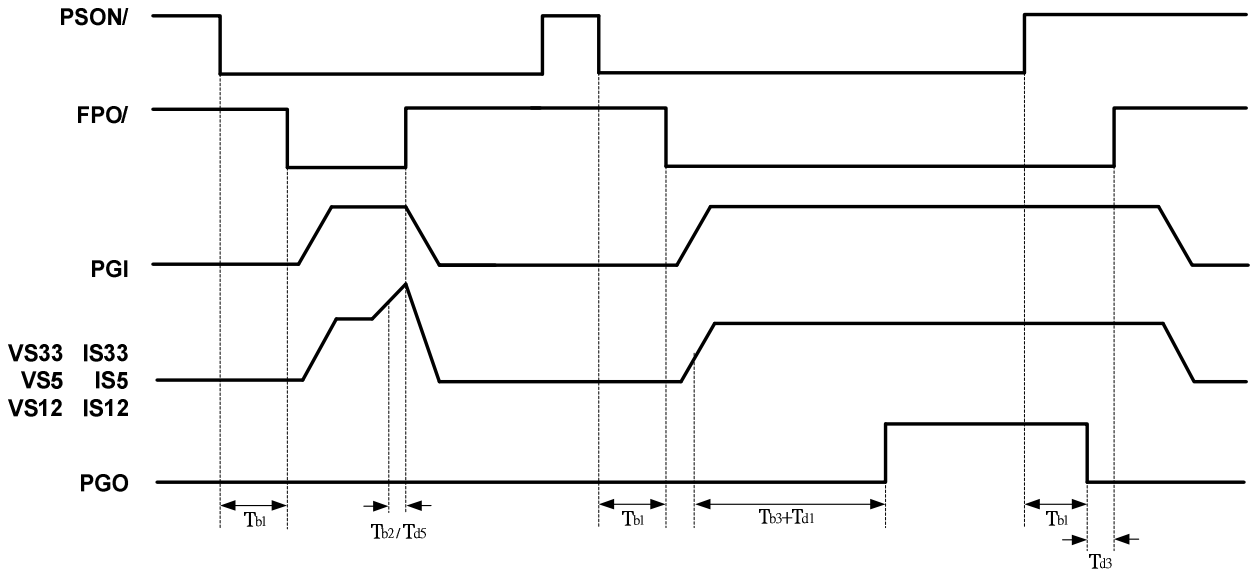


Timing Chart

1. PSON/ Signal Characteristics

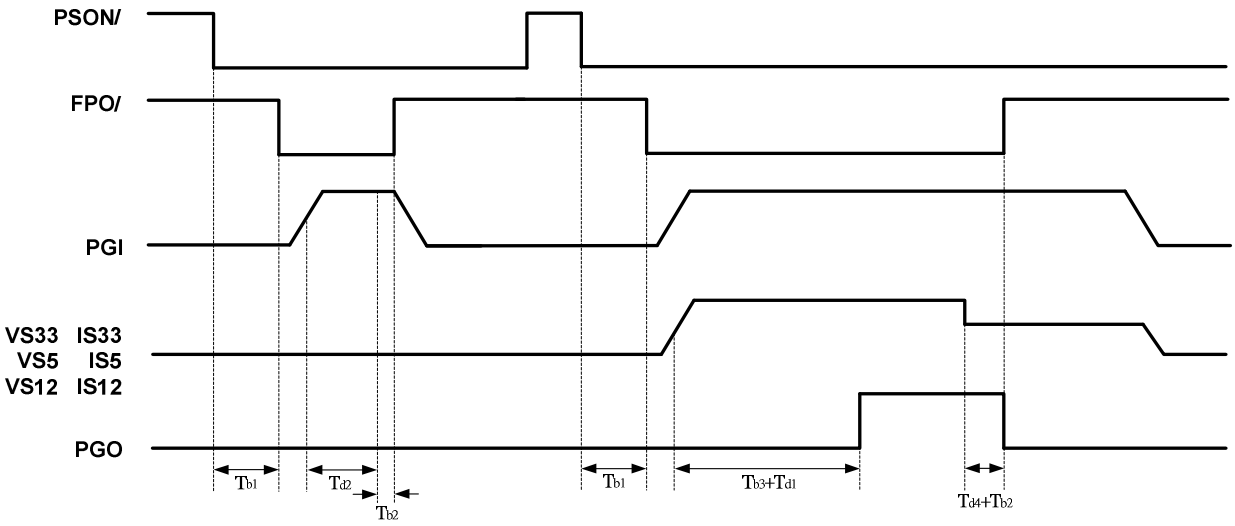


2. Over-voltage and Over-current Characteristics

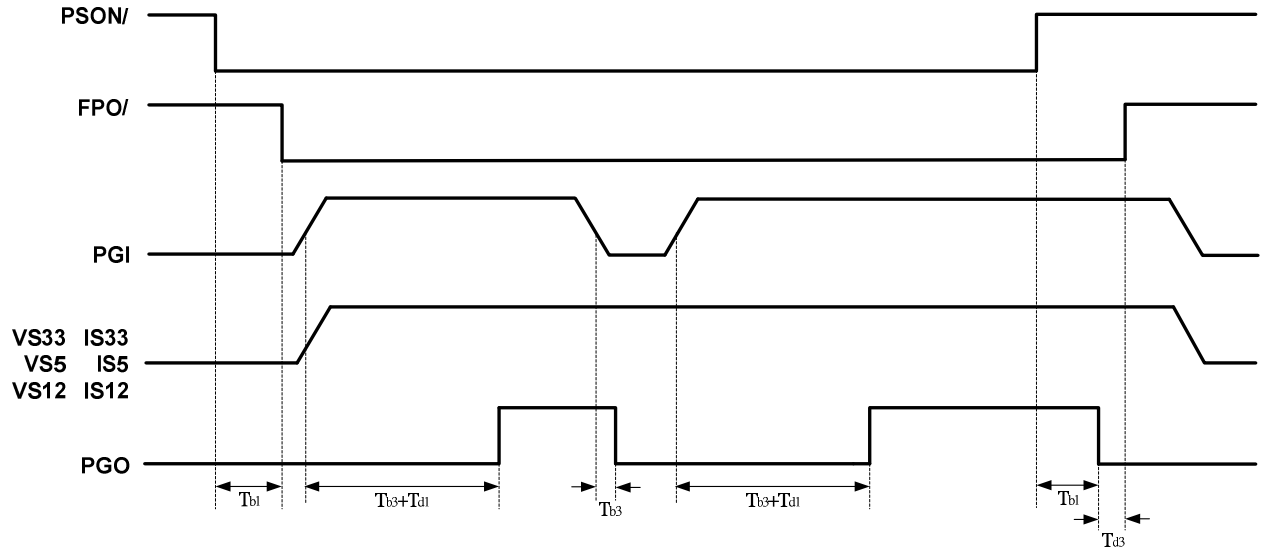


Timing Chart (Cont.)

3. Under-voltage Characteristics



4. PGI Characteristics



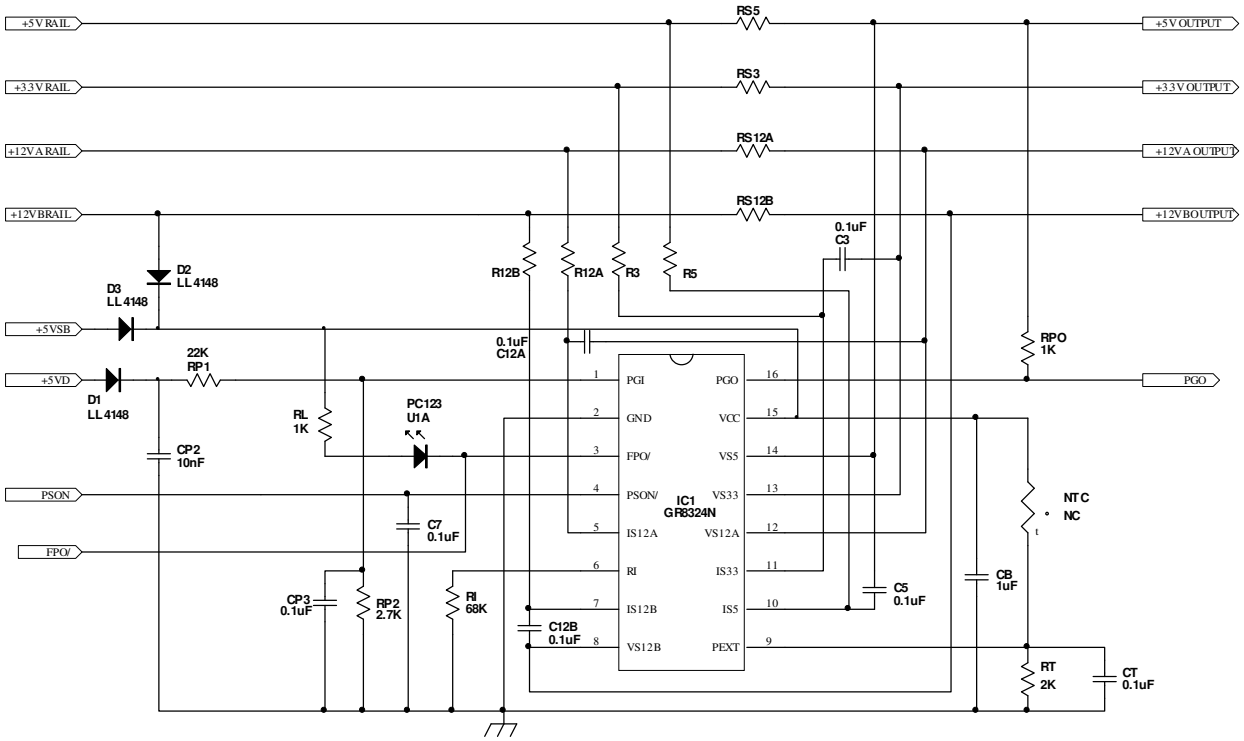
Electrical Characteristics (VCC = 5V, Ta = 25℃)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
POWER SUPPLY						
Supply voltage		VCC	4	5.0	16.0	V
Supply current	$V_{PSON/}$ = 5V	Ivcc			1	mA
OVER-VOLTAGE PROTECTION						
Over-voltage threshold		VS33	3.8	3.9	4.0	V
		VS5	5.6	5.8	6.0	V
		VS12A/B	13.5	14.0	14.2	V
UNDER-VOLTAGE PROTECTION						
Under-voltage threshold		VS33	2.8	2.9	3.0	V
		VS5	4.2	4.4	4.6	V
		VS12A/B	10.3	10.8	11.0	V
OVER-CURRENT PROTECTION						
Constant current		I_{ref}	12.5	20.0	62.5	uA
Ratio of IS sink current to I_{RI}			7.6	8	8.4	
Offset voltage of OCP comparators		V_{offset}	-3		3	mV
PSON/						
High-level input threshold voltage		V_{IH}	1.4	1.5		V
Low-level input threshold voltage		V_{IL}		1.0	1.1	V
PGI AND PGO, FPO/						
Threshold voltage for Td1		$V_{PGI,Td1}$	1.16	1.25	1.33	V
Threshold voltage for Td2		$V_{PGI,Td2}$	0.60	0.63	0.75	V
Threshold voltage for UV,OC		V_{PGI}	1.05	1.13	1.21	V
PGI Hysteresis		V_{PGI}	±20	±50	±80	V
Leakage current (PGO)	V_{PGO} = 5V	I_{LKG}			5	uA
Low level output voltage (PGO)	I_{SINK} = 10mA	V_{OL}			0.35	V
Leakage current (FPO/)	$V_{FPO/}$ = 5V	I_{LKG}			5	uA
Low level output voltage(FPO/)	I_{SINK} = 10mA	V_{OL}			0.35	V
EXTERNAL PROTECTION						
Threshold voltage		V_{TH}	1.16	1.25	1.33	V

Electrical Characteristics (Cont.)

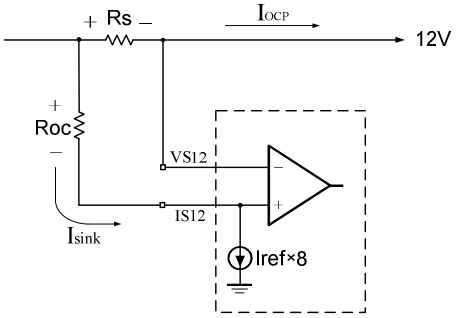
Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
SWITCHING CHARACTERISTICS						
PSON/ debounce time		Tb1	24	38	61	mS
FPO/ noise de-glitch time		Tb2	9	14	19	uS
PGO noise de-glitch time		Tb3	47	73	110	uS
PGI to PGO delay time		Td1	200	300	480	mS
UVP/OCP protection delay time		Td2	49	75	114	mS
PGO to FPO/ delay time		Td3	2	4	6	mS
Under-voltage delay time		Td4	0.6	1	1.4	mS
Over-current delay time		Td5	13	20	27	mS

Typical Application Circuit



Application Information

1. The GR8324N 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}*Rs = I_{sink}*Roc,

Select Rs = 2mΩ, RI = 62.5KΩ,

Then I_{sink} = (1.25V/RI)*8 = 160uA.

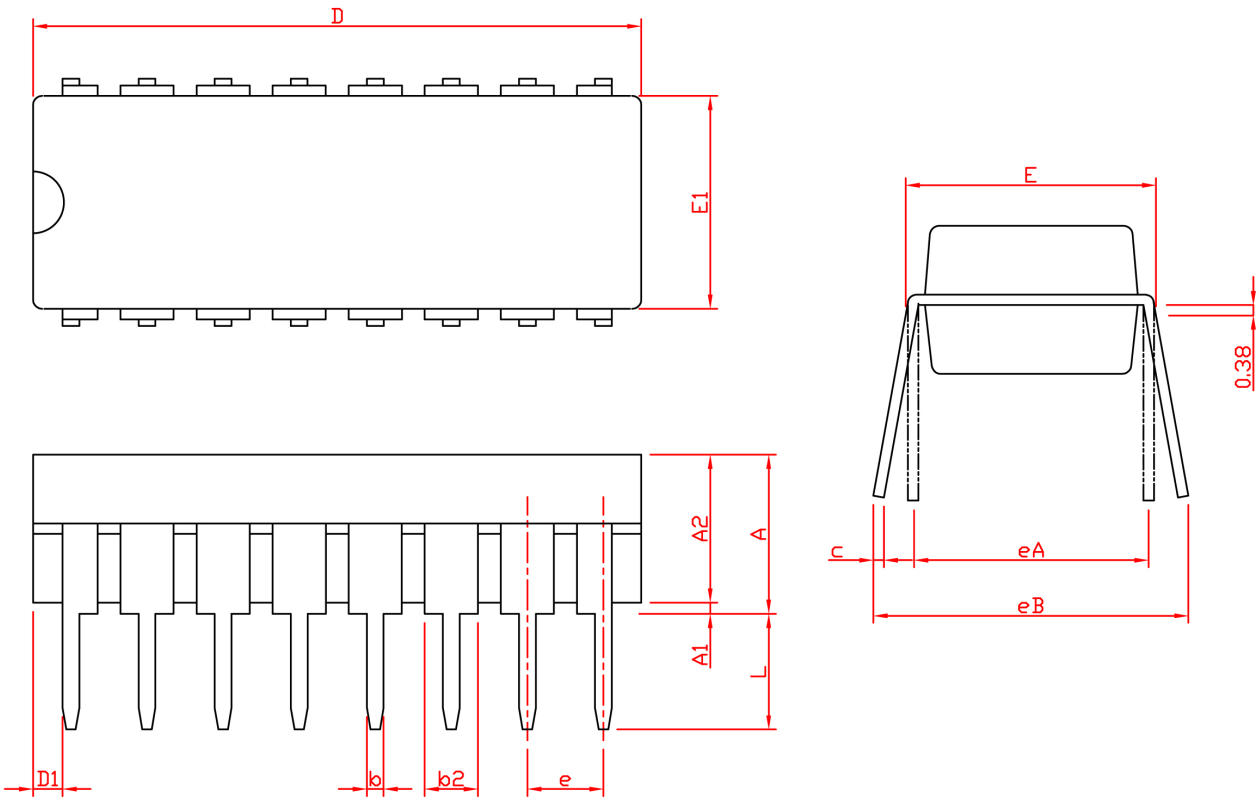
Thus,

Roc = 20A*2mΩ/160 uA = 250Ω

The recommend sense resistor values of RS12A, RS12B, RS5, and RS3 are ≧ 0.002Ω for good accuracy and enough SNR.

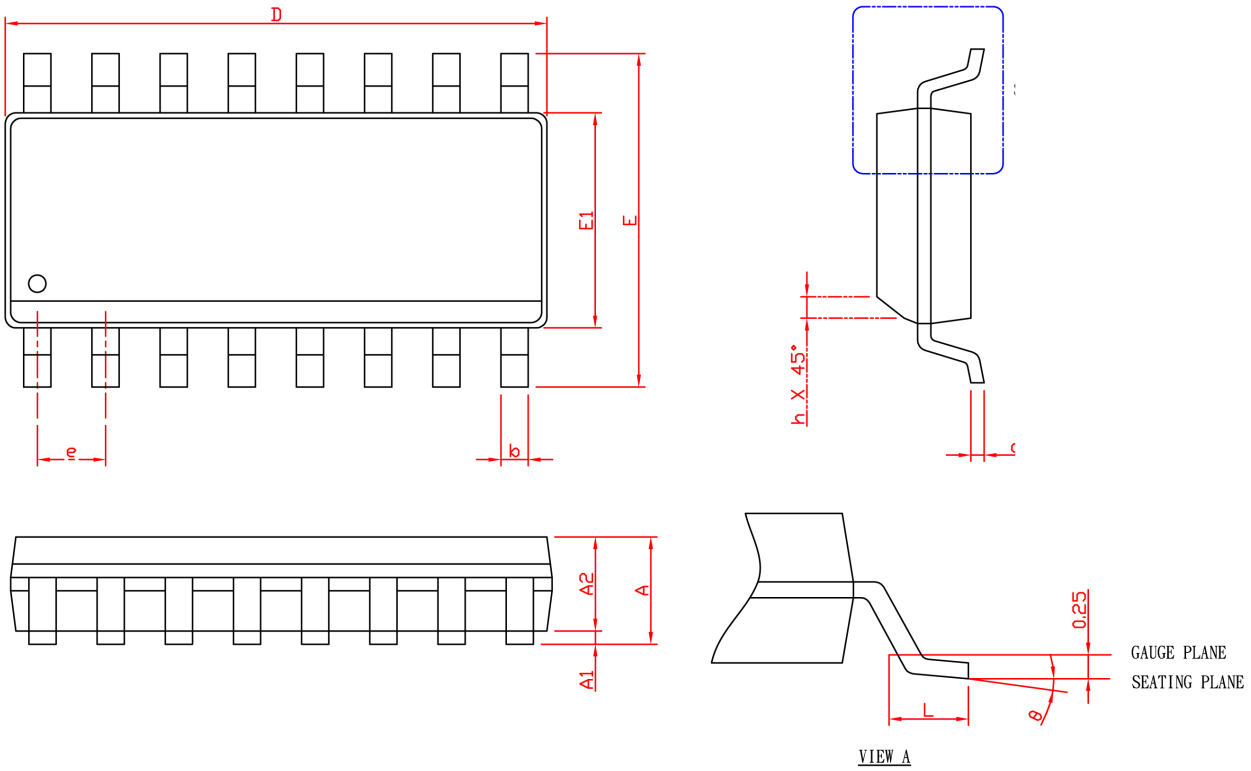
2. The power supply bypass capacitor CB suggests to be 0.1uF~ 10uF and layout nearby the pin VCC and GND. The other bypass capacitors for OCP or other input and output function pin suggests to be 0.01uF~1uF.

Package Information



SYMBOL	DIP-16			
	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

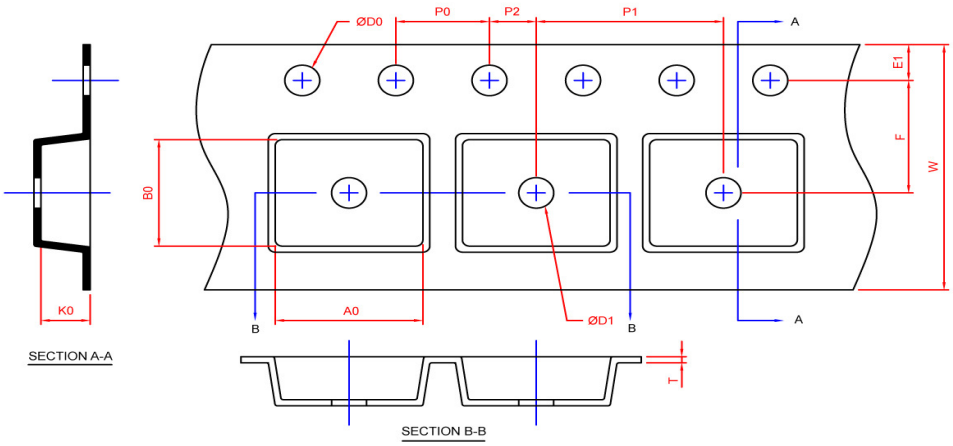
Package Information

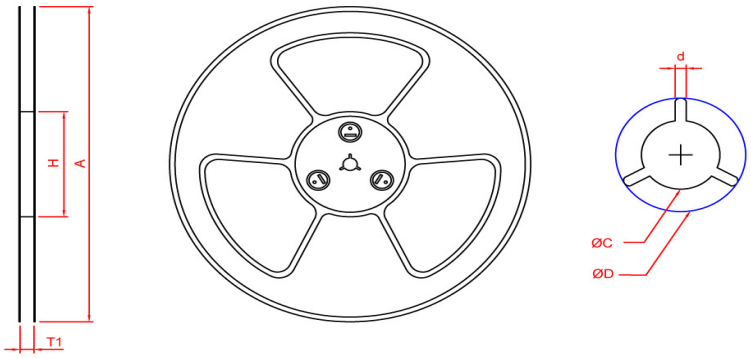


SYMBOL	SOP-16			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.75		0.069
A1	0.10	0.25	0.004	0.010
A2	1.25		0.049	
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	9.80	10.00	0.386	0.394
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

Carrier Tape & Reel Dimensions

SOP-16





Application	A	H	T1	C	d	D	W	E1	F
SOP-16	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+0.1 -0.0	1.5 MIN.	0.3±0.05	6.5±0.1	10.3±0.1	2.1±0.1

(mm)

Application	Devices Per Reel
SOP-16	2500