GL2775

GL2775 Simple Switcher 2A Step-Down Voltage Regulator & Operational Amplifier

Description

Many chargers use the well-known device 2575 in conjunction with operational amplifiers. This allows introducing an additional adjustment for the Over-Current Protection (OCP) and Over Voltage Protection (OVP). In this case the OCP and OVP value can be changed with help external resistors. And it can be fixed old version have OCP latch problem.

GL2775 includes both devices – the 2575 and two Ops, thereby reducing the size and cost for charger applications.

The GL2775 provides all the active functions for a step-down (buck) switching regulator and is capable of driving 2A load with excellent line and load regulation. It includes an internal frequency compensation components and a fixed-frequency oscillator. Among other features are a guaranteed ±2% tolerance on an output voltage within the specified input voltages and output load conditions, and ±10% on the oscillator frequency. External shutdown is included, featuring 120 μA (typical) standby current.

The GL2775 has OVP function. If Voltage of pin OVP overshoots 1.25V, OVP is happened and the circuit is OFF with Istb~120uA (typical). When the voltage is fall down less 0.7V, the circuit is ON.

The output switch includes cycle-by-cycle current limiting and thermal shutdown elements for a full protection under fault conditions.

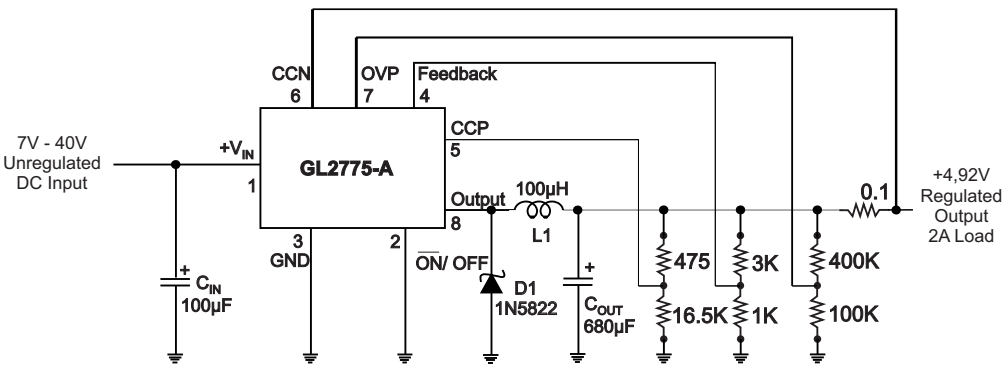
The high gain, internally frequency-compensated operational amplifiers were designed specifically to operate from a single power supply over a wide range of voltages.

These devices is an adjustable output version.

Features

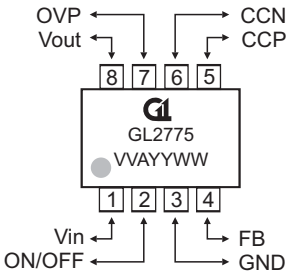
- Just adjustable output versions
- Adjustable output version output voltage range 1.23V to 37V ±2% max over line and load conditions
- 2A output current
- Input voltage range up to 40V
- Include adjustable OCP and OVP function
- TTL shutdown capability, low power standby mode
- Thermal shutdown, current limit protection
- Uses standard inductors
- 52 kHz fixed frequency internal oscillator
- Low input offset voltage and offset current of OpAmp
- Internal frequency compensation of OpAmp

TYPICAL APPLICATIONS



◆ MARKING INFORMATION & PIN CONFIGURATIONS (Top View)

SOP- 8F



V V, VVV = Output Voltage (A =A dj)
A = Assembly Location
YY =Year
W W =Weekly

◆ ORDERING INFORMATION (Green Package Products are available now!)

Ordering Number	Output Voltage	Package	Shipping
GL2775-AS8R	A d j	SOP-8	2,500 Units/ Tape & Reel

* For detail Ordering Number identification, please see last page.

◆ ABSOLUTE MAXIMUM RATINGS

Rating	Value	Unit
Maximum Supply Voltage	45	V
$\overline{ON}$/OFF Pin Input Voltage	$-0.3 \le V \le V_{IN}$	V
Output Voltage to Ground (Steady State)	-1.0	V
Power Dissipation	Internally Limited	-
Storage Temperature Range	-65 to + 150	°C
Maximum Junction Temperature	+150	C
Minimum ESD Rating (C=100pF, R=1.5kΩ)	2	kV
Lead Temperature (Soldering, 10 seconds)	+260	C
Input differential voltage range	45	V
$\overline{Input}$ common mode voltage range	$-0.3 \le V \le 45$	V

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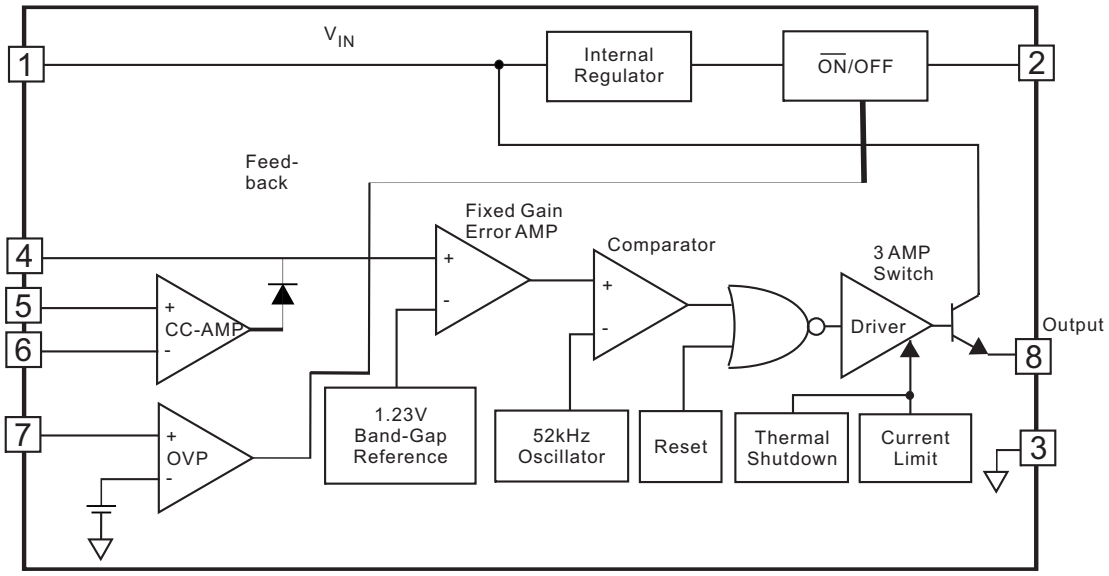
◆ OPERATING RATINGS

Rating	Value	Unit
Operating Temperature Range	$-40 \le T_J \le 125$	°C
Supply Voltage	40	V

◆ BLOCK DIAGRAM



◆ ELECTRICAL CHARACTERISTICS:GL2775-ADJ

(Specifications with standard type face are for T_J = 25°C, and those with **boldface type** apply over full Operating Temperature Range.)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Feedback Voltage	V_{IN} = 12V, I_{LOAD} = 0.5A, V_{OUT} = 5V	V_{OUT}	1.217	1.230	1.243	V
Feedback Voltage - GL2775	$8V \le V_{IN} \le 40V$, $0.5A \le I_{LOAD} \le 2.0A$ V_{OUT} = 5V	V_{OUT}	1.206/**1.180**	1.230	1.255/**1.280**	V
Efficiency	V_{IN} = 12V, I_{LOAD} =2.0A, V_{OUT}=5V	η	-	77	-	%

GL2775 Simple Switcher 2A Step-Down Voltage Regulator & Operational Amplifier

◆ ELECTRICAL CHARACTERISTICS: All Output Voltage Versions

(Specifications with standard type face are for T_J = 25°C, and those with **boldface type** apply over full Operating Temperature Range. Unless otherwise specified, V_{IN}= 12V for the 3.3V, 5.0V and ADJ version, V_{IN}= 25V for 12V version. and V_{IN}= 30V for 15V version. I_{LOAD} = 500 mA)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Feedback Bias Current	V_{OUT} = 5V (Adjustable Version Only)	I_b	-	50	100 / **500**	nA
Oscillator Frequency	(Note 8)	f_o	47 / **42**	52	58 / **63**	kHz
Saturation Voltage	I_{OUT} = 2A (Notes 4)	V_{SAT}	-	1.1	1.25 /1.**35**	V
Max Duty Cycle (ON)	(Note 5)	DC	93	98	-	%
Current Limit	(Note 4, 8)	I_{CL}	2.5 / **2.3**	3.4	4.6 / **5.2**	A
Output Leakage Current	(Notes 6, 7) Output = 0 V Output = -1V	I_L	- -	0.4 10	2 30	mA
Quiescent Current	(Note 6)	I_Q	-	5.5	11	mA
Standby Quiescent Current	$\overline{ON}$/OFF Pin = 5V (OFF)	I_{STBY}	-	120	330	μA
$\overline{ON}$/OFF Pin Logic Input Level	V_{OUT}=0V	V_{IH}	2.2 / **2.4**	1.4	-	V
	V_{OUT} = Nominal Output Voltage	V_{IL}	-	1.2	1.0 / **0.8**	V
$\overline{ON}$/OFF Pin Input Current	$\overline{ON}$/OFF Pin = 5V (OFF)	I_{IH}	-	12	30	μA
	$\overline{ON}$/OFF Pin = 0V (ON)	I_{IL}	-	0	10	μA
Input Offset Voltage	V_{CC} = 5V to 40, V_{IC}=0V V_{FB} = 1.5V	V_{IO}		4	11	mV
Average Temperature Coefficient of Input Offset Voltage		αV_{IO}		10	15	uV/C
Input Offset Current	V_{CM} = 0V	I_{IO}		8	100/**300**	nA
Average Temperature Coefficient of Input Offset Voltage		αI_{IO}		20		pA/ C
Input Bias Current	V_{CM} = 0V	I_{IB}		-30	-500/**-800**	nA
Common-Mode Input Voltage Range	V_{CC} = 5V to MAX	V_{ICR}		0 to V_{CC}-1.5		V
				0 to V_{CC}-2		
High-Level Output Voltage	$R_L \geq$ 15kΩ, Vcc=40V	V_{OH}	37.5	38		V
Low-Level Output Voltage	$R_L \geq$ 10kΩ	V_{OL}		5	20/**30**	mV
Common Mode Rejection Ration	V_{CC} = 5V to Vcc -1.5V	CMRR	65	80		dB
High Voltage OVP		OVP_H	1.19/**1.15**	1.25	1.31/**1.35**	V
Low Voltage OVP		OVP_L		0.7		V

◆ ELECTRICAL CHARACTERISTICS

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. Guaranteed specifications and Test conditions are shown in Electrical Characteristics.

Note 2: All limits guaranteed at 25°C（standard type face）and over full operating temperature range（bold type Face）. All 25°C limits are 100% production tested. All limits over full operating temperature range are guaranteed via correlation using standard Statistica Quality Control methods.

Note 3: External components such as the catch diode, inductor, input and output capacitors can affect switching regulator system performance. When the GL2775 is used as shown in the Figure 1 test circuit, system performance will be as shown in system parameters section of Electrical Characteristics.

Note 4: Output pin sourcing current. No diode, inductor or capacitor connected to output.

Note 5: Feedback pin removed from output and connected to 0V.

Note 6: Feedback pin removed from output and connected to +12V for the Adjustable.

Note 7: V_{IN} = 40V

Note 8: The oscillator frequency reduces to approximately 11 kHz in the event of an output short or an overload which causes the regulated output voltage to drop approximately 40% from the nominal output voltage. This self- protection feature lowers the Average power dissipation of GI2775 by lowering the minimum duty cycle from 5% down to approximately 2%.

Typical Performance Characteristics

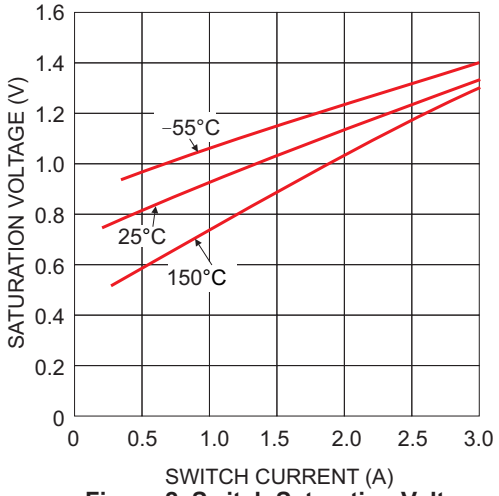


Figure 2. Switch Saturation Voltage

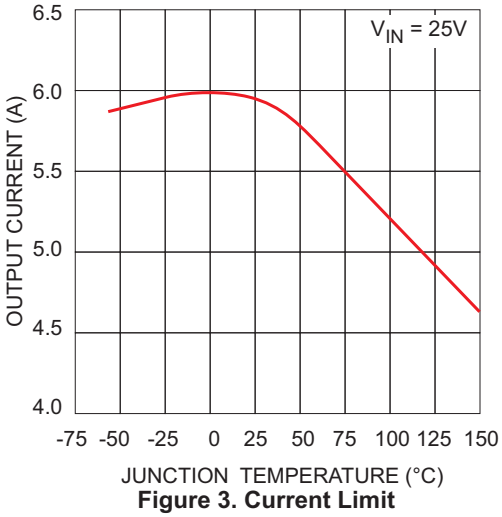


Figure 3. Current Limit

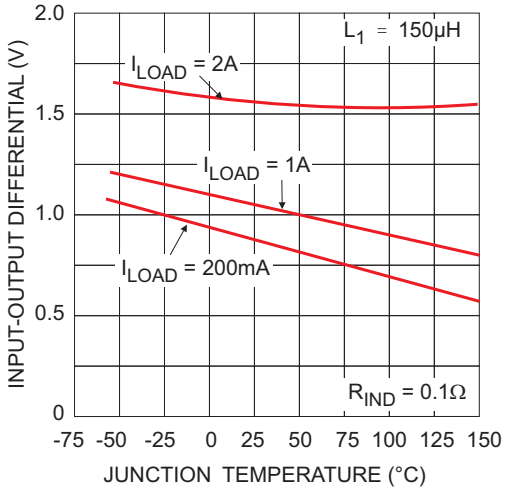


Figure 4. Dropout Voltage

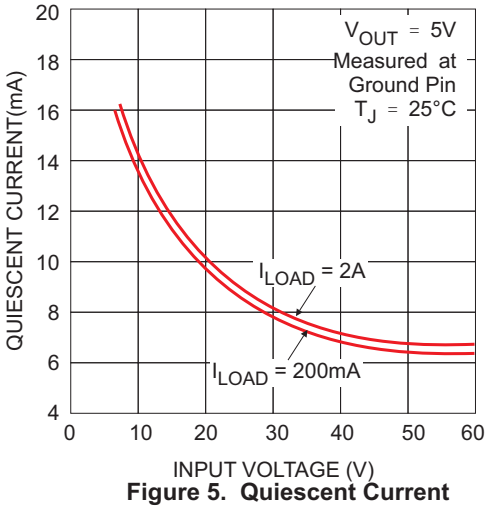


Figure 5. Quiescent Current

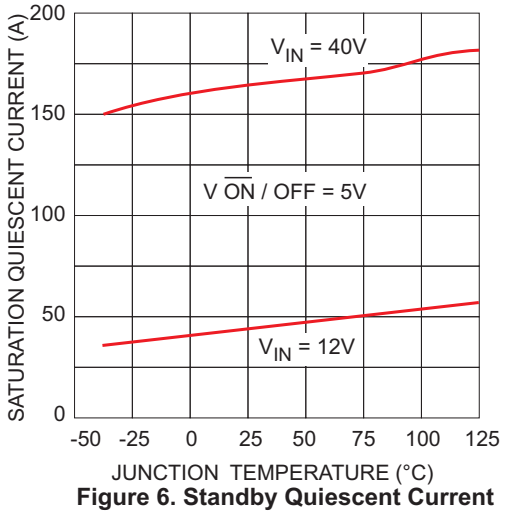


Figure 6. Standby Quiescent Current

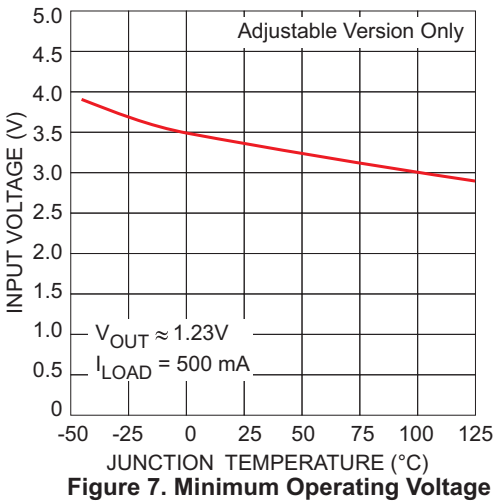


Figure 7. Minimum Operating Voltage

◆ Typical Performance Characteristics

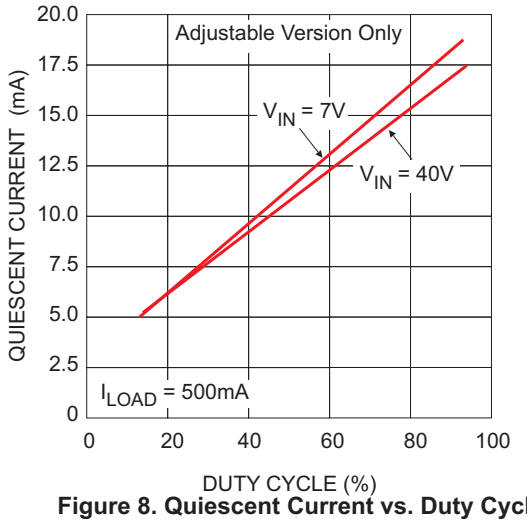


Figure 8. Quiescent Current vs. Duty Cycle

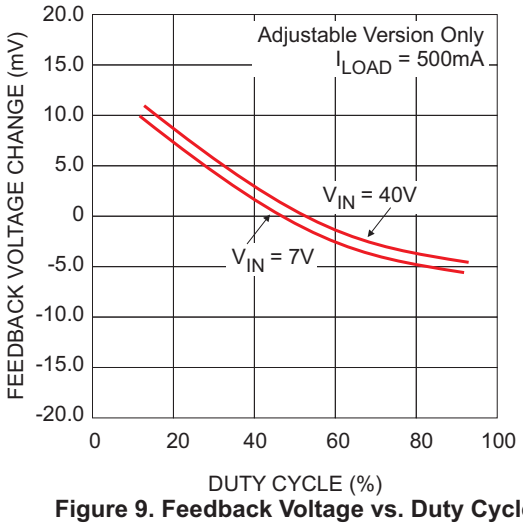


Figure 9. Feedback Voltage vs. Duty Cycle

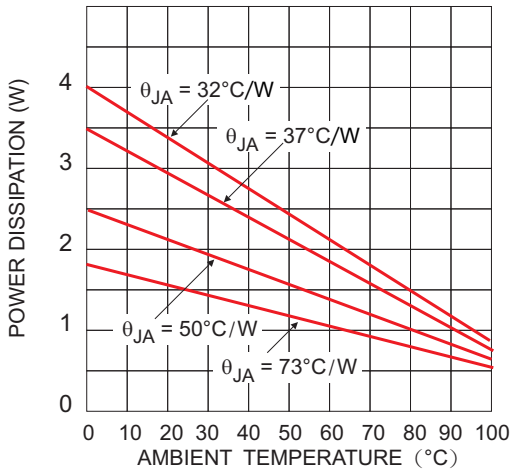


Figure 10. Maximum Power Dissipation(SOP-8F)

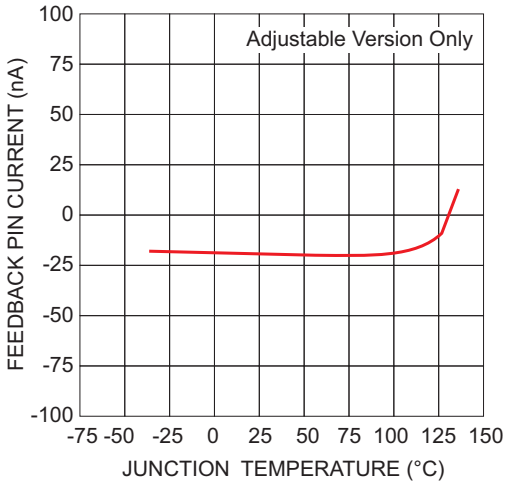


Figure 11. Feedback Pin Current

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◆ Typical Performance Characteristics

Figure 12. Switching Waveforms

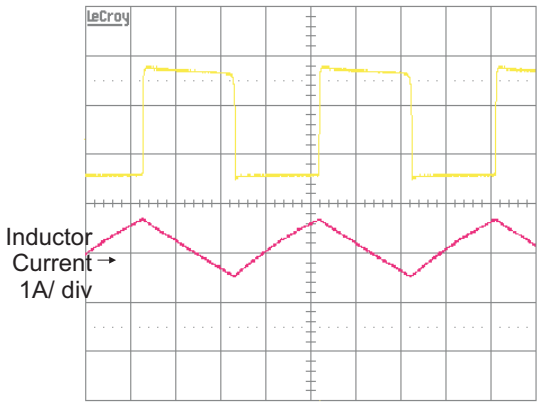
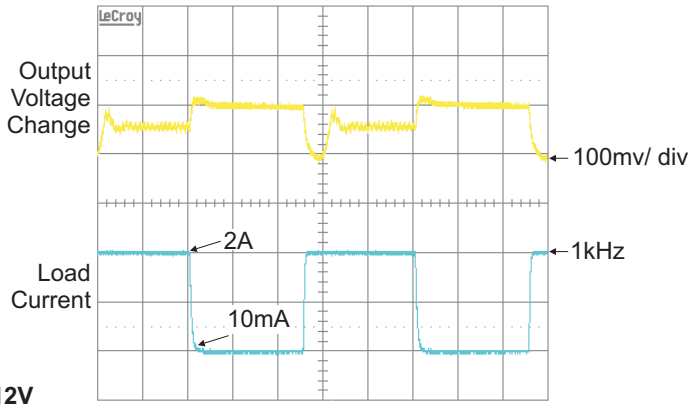


Figure 13. Load Transient Response



Input : 12V
Output : 5V @2A

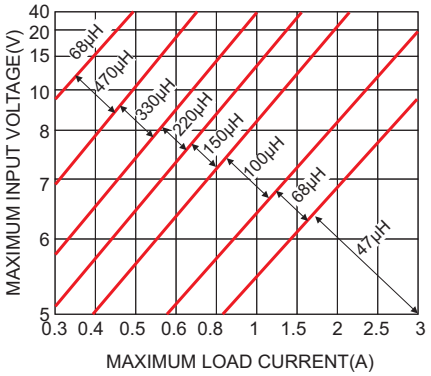


Figure 14. GL2775 -3.3

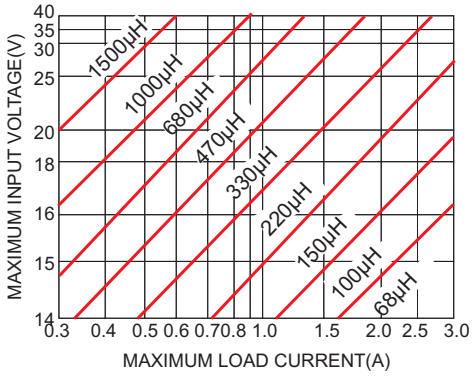


Figure 15. GL2775 - 12

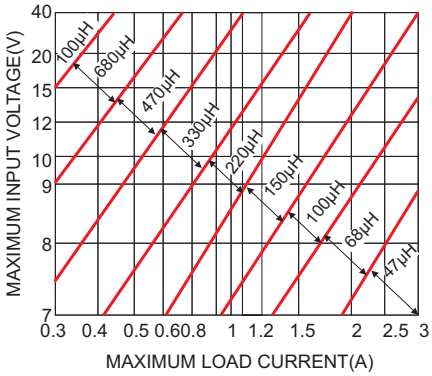


Figure 16. GL2775 -5.0

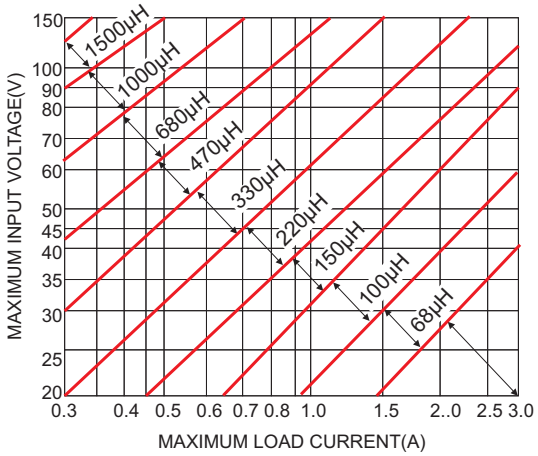


Figure 17. GL2775- ADJ

$$E\ T = (V_{IN} - V_{OUT}) \frac{V_{OUT}}{V_{IN}} \frac{1{,}000}{F(\text{in kHz})}$$

PROCEDURE(Adjustable Output Voltage Versions)
Given:

V_{OUT} = Regulated Output Voltage
V_{IN}(Max) = Maximum Input Voltage
I_{LOAD}(Max) = Maximum Load Current
F = Switching Frequency (Fixed at 52 kHz)

1. Programming Output Voltage(Selecting R1 and R2, as shown in Figure 12. And Figure 13.

Use the following formula to select the appropriate resistor values.

$$V_{OUT} = V_{REF} \left(1 + \frac{R2}{R1} \right) \quad \text{where } V_{REF} = 1.23V$$

R_1 can be between 1k and 5k. (For best temperature coefficient and stability with time, use 1% metal film resistors)

$$R2 = R1 \left(\frac{V_{OUT}}{V_{REF}} - 1 \right)$$

EXAMPLE (Adjustable Output Voltage Versions)
Given:

V_{OUT} = 10V
V_{IN}(Max) = 25V
I_{LOAD}(Max) =2A
F = 52kHz

1. Programming Output Voltage (Selecting R1 and R2)

$$V_{OUT} = 1.23 \left(1 + \frac{R2}{R1}\right) \quad \text{Select R1 = 1k}$$

$$R_2 = R_1 \left(\frac{V_{OUT}}{V_{REF}} - 1 \right) = 1k \left(\frac{10V}{1.23V} - 1 \right)$$

R_2 = 1k (8.13 - 1) = 7.13k, closest 1% value is 7.15k

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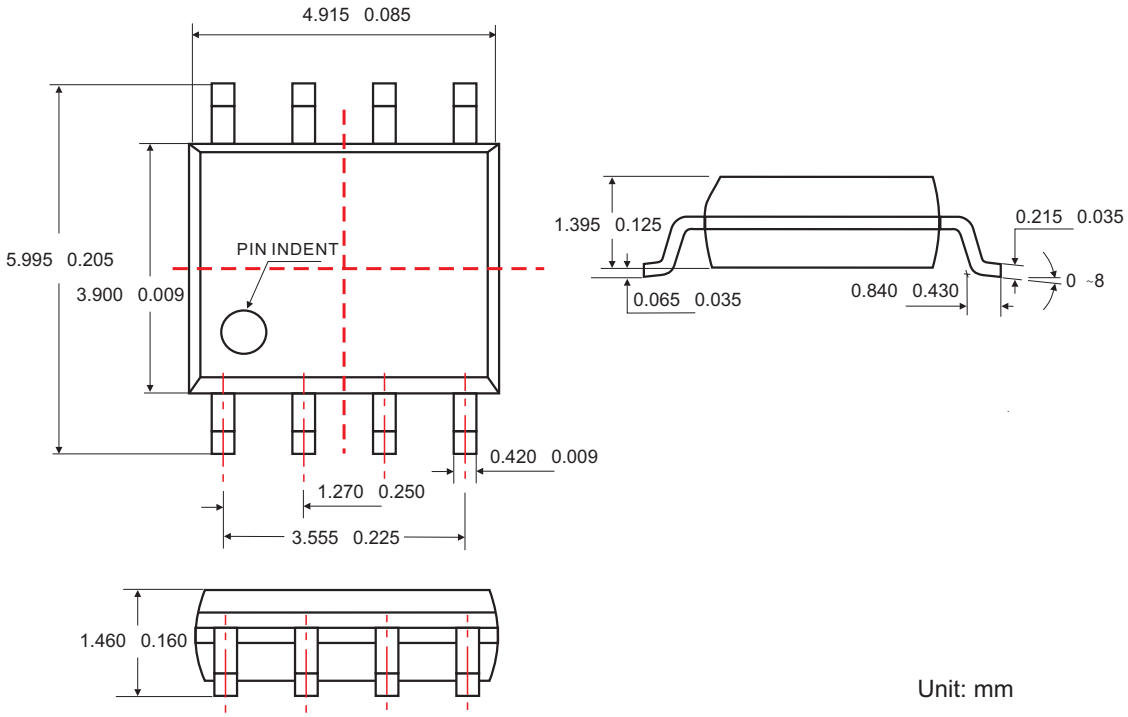
SOP-8F PACKAGE OUTLINE DIMENSIONS



Unit: mm

ORDERING NUMBER

GL2775 A SF8 R

- GL2775 — Circuit Type
- A — Output Voltage
- SF8 — Package
  - S8: SOP-8
- R — Shipping
  - R: Tape & Reel