

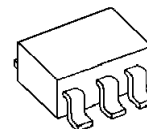
## Battery Charger IC

### ■ GENERAL DESCRIPTION

The NJM2337 is a constant voltage and constant current control IC which contains precision voltage reference.

It is suitable for battery charger, secondary controller of switching regulator systems, and other battery systems.

### ■ PACKAGE OUTLINE

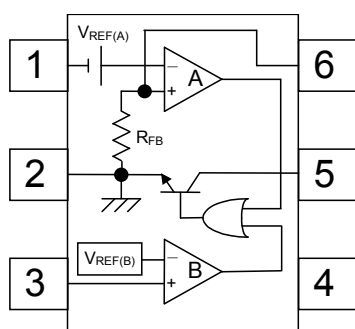


NJM2337AF1/BF1/CF1

### ■ FEATURES

- |                                        |                  |
|----------------------------------------|------------------|
| ● Operating Voltage                    | 2.2V to 13V      |
| ● Internal Precision Voltage Reference | 1.24V $\pm$ 1%   |
| ● Photo Coupler (PC) Drive Current     | 20mA max.        |
| ● Operating Current                    | 280 $\mu$ A max. |
| ● Bipolar Technology                   |                  |
| ● Package Outline                      | SOT-23-6-1       |

### ■ PIN CONFIGURATION



#### Pin Function

1. A-INPUT
2. GND
3. B+INPUT
4. V<sup>+</sup>
5. PC
6. A+INPUT

## ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER                   | SYMBOL    | MAXIMUM RATINGS      | UNIT |
|-----------------------------|-----------|----------------------|------|
| Supply Voltage              | $V^+$     | +14                  | V    |
| Differential Input Voltage  | $V_{ID}$  | (Ach) 14<br>(Bch) 14 | V    |
| Power Dissipation           | $P_D$     | 200                  | mW   |
| PC Terminal Current         | $I_{PC}$  | 20                   | mA   |
| Operating Temperature Range | $T_{opr}$ | -40 to +85           | °C   |
| Storage Temperature Range   | $T_{stg}$ | -50 to +150          | °C   |

## ■ RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

| PARAMETER         | SYMBOL    | OPERATING CONDITIONS | UNIT |
|-------------------|-----------|----------------------|------|
| Operating Voltage | $V_{opr}$ | 2.2 to 13            | V    |

## ■ ELECTRICAL CHARACTERISTICS ( $V^+=5V$ , Ta=25°C)

| PARAMETER           | SYMBOL        | TEST CONDITION   | MIN. | TYP. | MAX. | UNIT |
|---------------------|---------------|------------------|------|------|------|------|
| Operating Current   | $I_{CC}$      | $I_{PC}=off$     | —    | 200  | 280  | μA   |
| Leakage Current     | $I_{PCLEAK}$  | $V^+=V_{PC}=13V$ | —    | —    | 1    | μA   |
| Saturation Voltage  | $V_{PC(SAT)}$ | $I_{PC}=20mA$    | —    | 0.1  | 0.3  | V    |
| Feedback Resistance | $R_{FB}$      |                  | 0.7  | 1.0  | 1.3  | kΩ   |

[A ch]

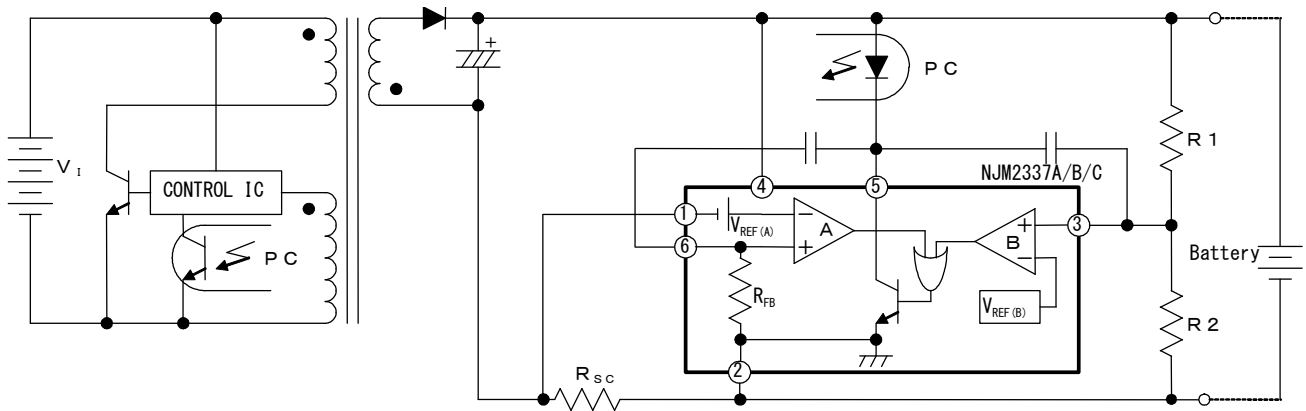
| PARAMETER                       | SYMBOL       | TEST CONDITION | MIN. | TYP.        | MAX. | UNIT |
|---------------------------------|--------------|----------------|------|-------------|------|------|
| Reference Voltage               | $V_{REF(A)}$ | A version      | 69   | 72          | 75   | mV   |
|                                 |              | B version      | 105  | 109         | 113  | mV   |
|                                 |              | C version      | 145  | 151         | 157  | mV   |
| Input Bias Current              | $I_B$        |                | —    | 40          | 160  | nA   |
| Large Signal Voltage Gain       | $A_V$        |                | —    | 80          | —    | dB   |
| Input Common Mode Voltage Range | $V_{ICM}$    |                | —    | -0.2 to 3.0 | —    | V    |
| Common Mode Rejection Ratio     | CMR          |                | —    | 70          | —    | dB   |
| Supply Voltage Rejection Ratio  | SVR          |                | —    | 80          | —    | dB   |
| Slew Rate                       | SR           |                | —    | 0.5         | —    | V/μs |
| Gain Bandwidth Product          | GB           | f=10kHz        | —    | 1           | —    | MHz  |

[B ch]

| PARAMETER                       | SYMBOL       | TEST CONDITION | MIN. | TYP.       | MAX. | UNIT |
|---------------------------------|--------------|----------------|------|------------|------|------|
| Reference Voltage               | $V_{REF(B)}$ |                | 1227 | 1240       | 1253 | mV   |
| Input Bias Current              | $I_B$        |                | —    | 20         | 80   | nA   |
| Large Signal Voltage Gain       | $A_V$        |                | —    | 80         | —    | dB   |
| Input Common Mode Voltage Range | $V_{ICM}$    |                | —    | 0.5 to 4.0 | —    | V    |
| Common Mode Rejection Ratio     | CMR          |                | —    | 80         | —    | dB   |
| Supply Voltage Rejection Ratio  | SVR          |                | —    | 80         | —    | dB   |
| Slew Rate                       | SR           |                | —    | 0.5        | —    | V/μs |
| Gain Bandwidth Product          | GB           | f=10kHz        | —    | 1          | —    | MHz  |

## ■ TYPICAL APPLICATIONS

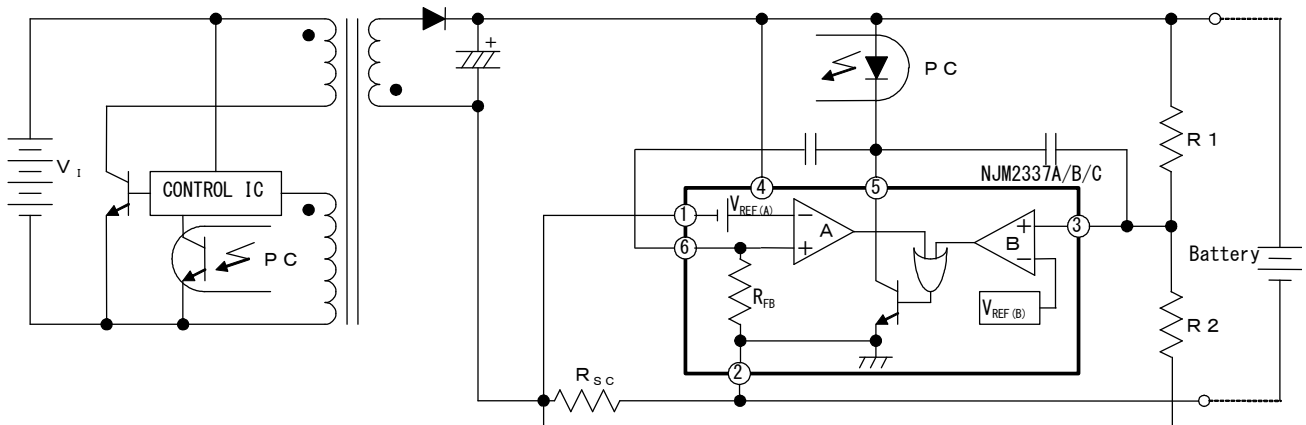
Application Circuit 1



$$\text{OUTPUT} = V_{\text{REF(B)}} \times \frac{R1+R2}{R2} \text{ [V]}$$

$$\text{CURRENT LIMIT} = \frac{V_{\text{REF(A)}}}{R_{\text{SC}}} \text{ [A]}$$

Application Circuit 2



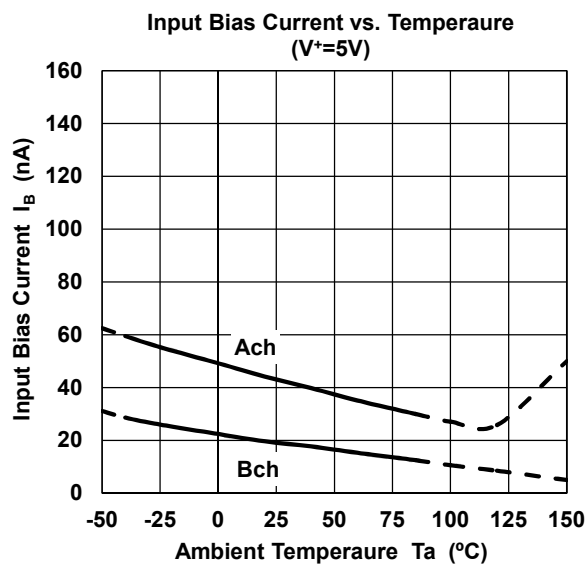
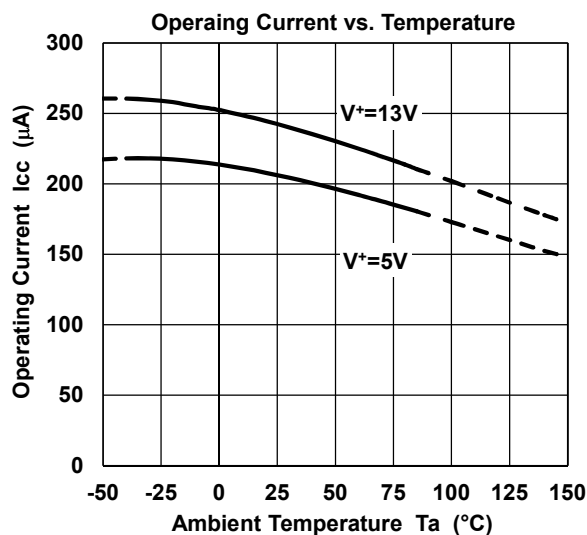
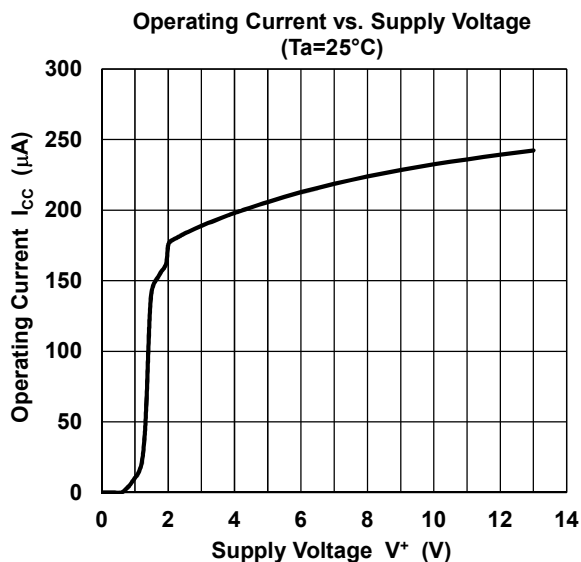
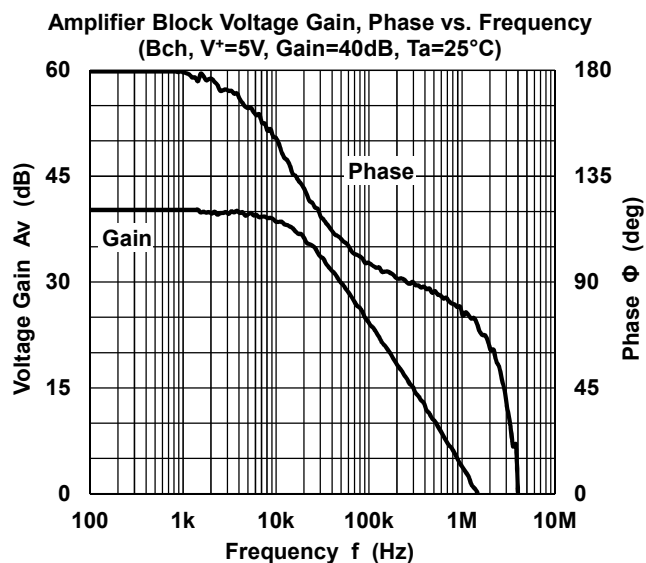
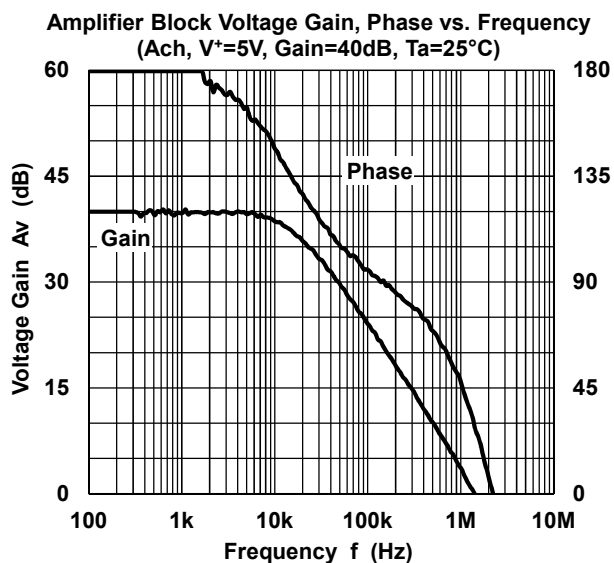
$$\text{OUTPUT} = \{V_{\text{REF(B)}} + (I_L \times R_{\text{SC}})\} \times \frac{R1+R2}{R2} - (I_L \times R_{\text{SC}}) \text{ [V]}$$

$$\text{CURRENT LIMIT} = \frac{V_{\text{REF(A)}}}{R_{\text{SC}}} \text{ [A]}$$

The A-INPUT pin voltage will be the negative voltage for application circuit 1 and 2.

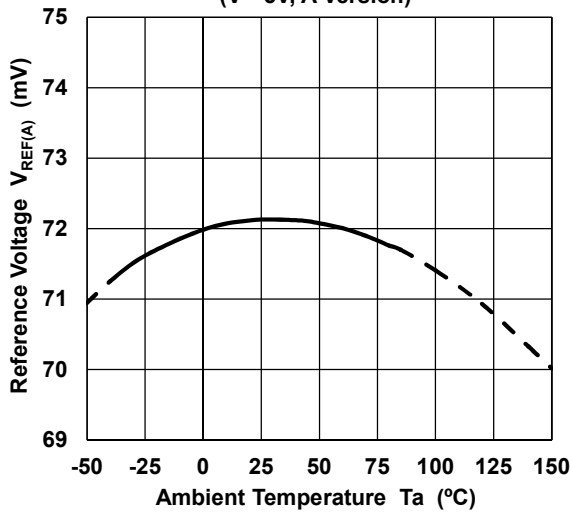
The underside common mode input voltage range ( $V_{\text{ICM-}}$ ) of the Ach amplifier tends to be increased by high temperature operates. It may deviate from  $V_{\text{ICM-}}$  depending on a reference voltage version.

## ■ TYPICAL CHARACTERISTICS

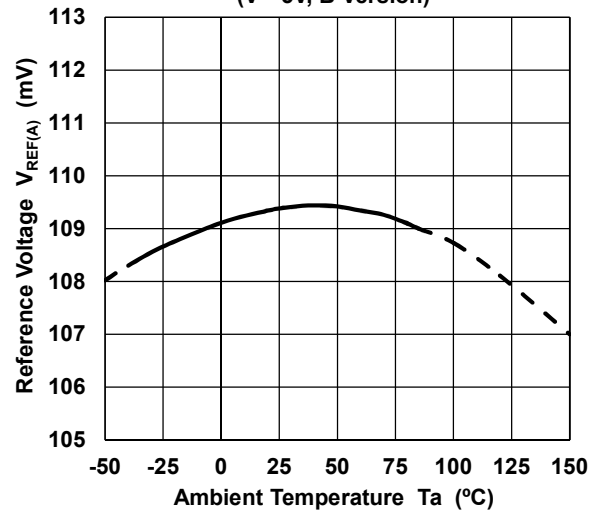


## ■ TYPICAL CHARACTERISTICS

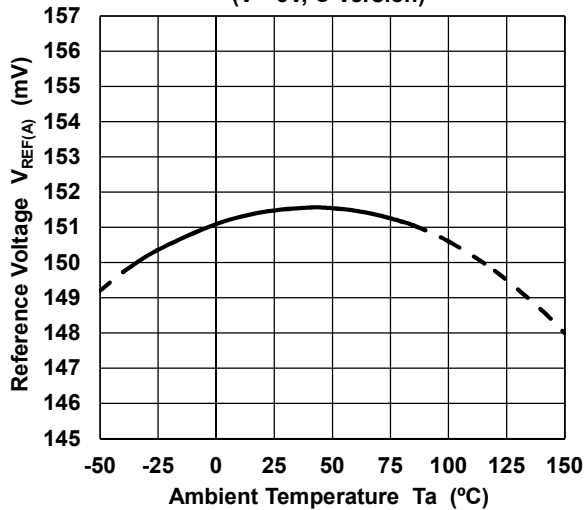
Reference Voltage  $V_{REF(A)}$  vs. Temperature  
( $V^+=5V$ , A Version)



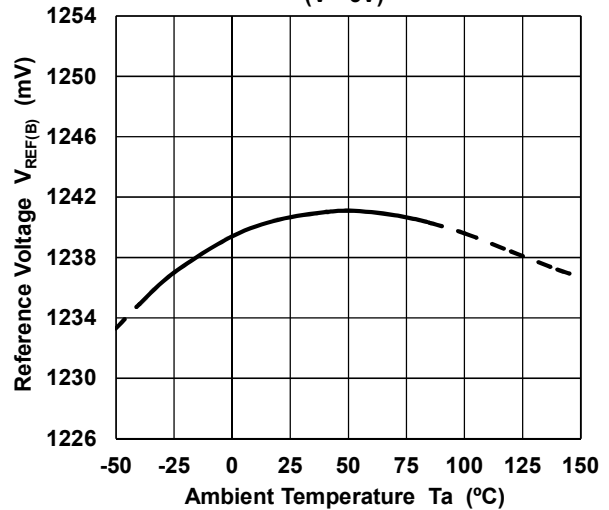
Reference Voltage  $V_{REF(A)}$  vs. Temperature  
( $V^+=5V$ , B Version)



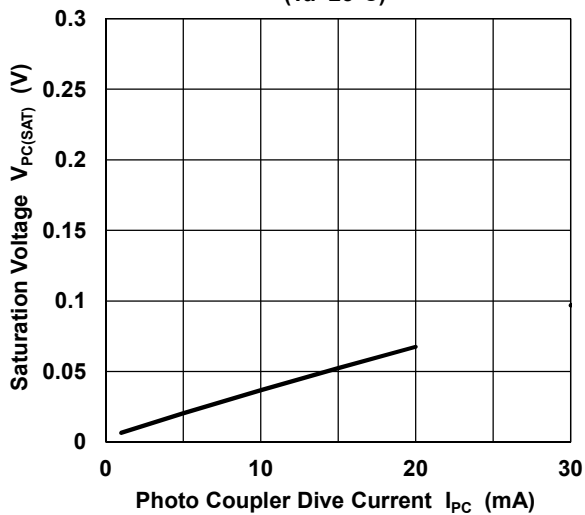
Reference Voltage  $V_{REF(A)}$  vs. Temperature  
( $V^+=5V$ , C Version)



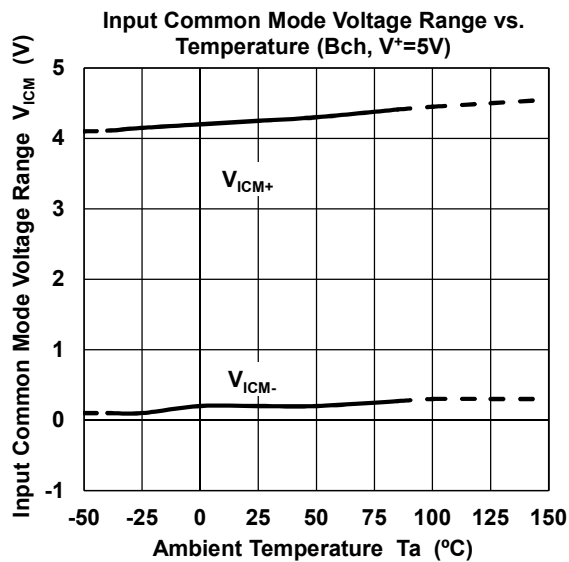
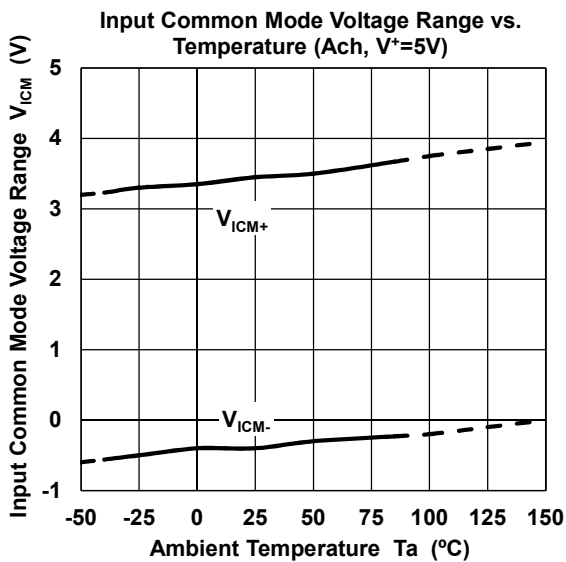
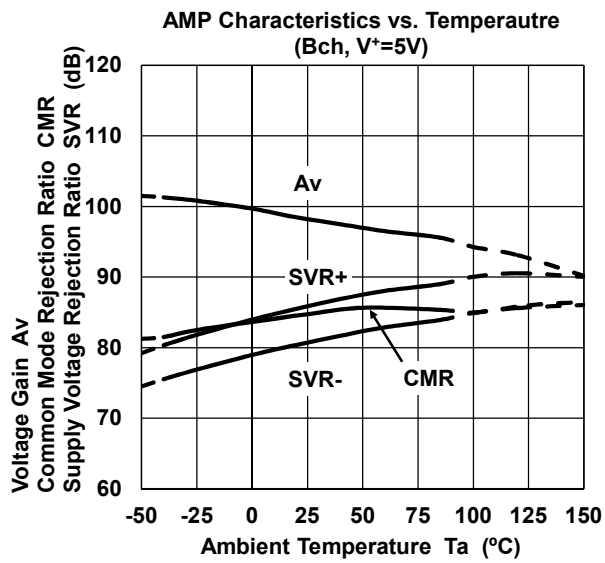
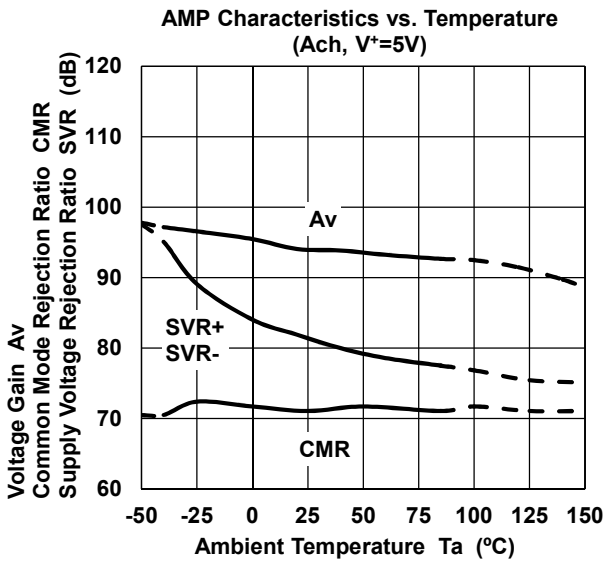
Reference Voltage  $V_{REF(B)}$  vs. Temperature  
( $V^+=5V$ )



Saturation Voltage vs. Photo Coupler Dive Current  
( $T_a=25^\circ\text{C}$ )



■ TYPICAL CHARACTERISTICS



[CAUTION]  
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