

Output Coupling Capacitor-less Video Amplifier with Power Supply Short-circuit Protection

■GENERAL DESCRIPTION

The **NJM2559** is a output coupling capacitor-less video amplifier with power supply short-circuit protection.*

When the DC voltage is impressed to the output terminal, it becomes a power saving mode, and IC is protected.

The NJM2559 is suitable for the video application at risk of power supply short-circuit.

*DC coupling

■PACKAGE OUTLINE

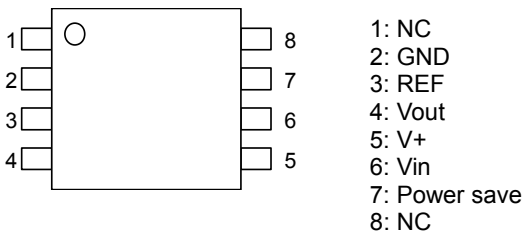


NJM2559RB1

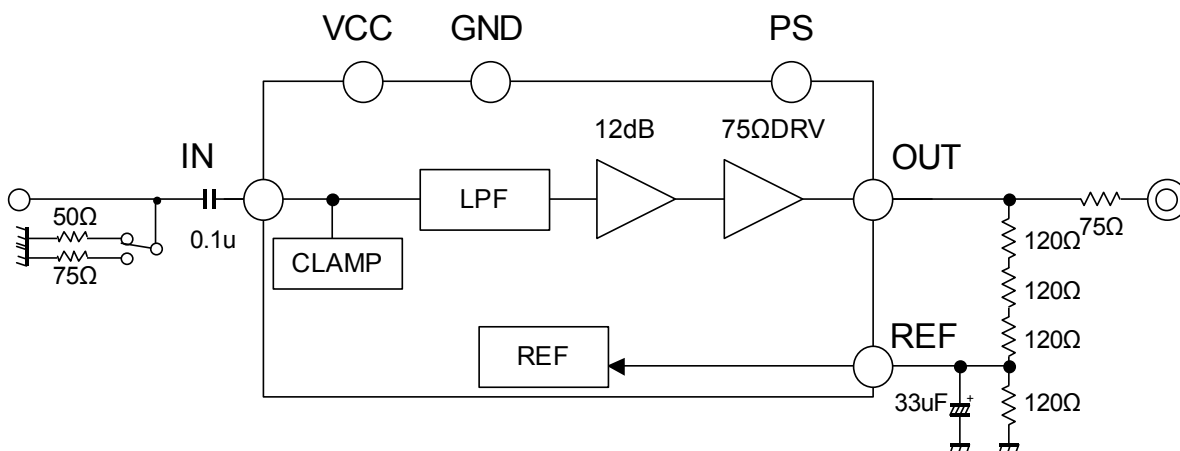
■FEATURES

- Operating Voltage 4.5 to 5.5V
- Output Coupling Capacitor-less (0.5V DC Output)
- Power Supply Short-circuit Protection Circuit
- Internal LPF -32dB typ. at 19MHz
- 12dB Amplifier
- 75Ω Driver
- Power-save Circuit
- Bipolar Technology
- Package Outline TVSP8

■PIN CONNECTION



■BLOCK DIAGRAM



NJM2559

■ABSOLUTE MAXIMUM RATINGS(Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------------------------|----------------|-------------|------|
| Supply Voltage | V ⁺ | 7.0 | V |
| Output Terminal Voltage | V _o | 13.5 | |
| Power Dissipation | P _D | 580 *1 | mW |
| Operating Temperature Range | Topr | -40 to +85 | °C |
| Storage Temperature Range | Tstg | -40 to +150 | °C |

(Note) At on a board of EIA/JEDEC specification. (114.3 x 76.2 x 1.6mm Two layers, FR-4)

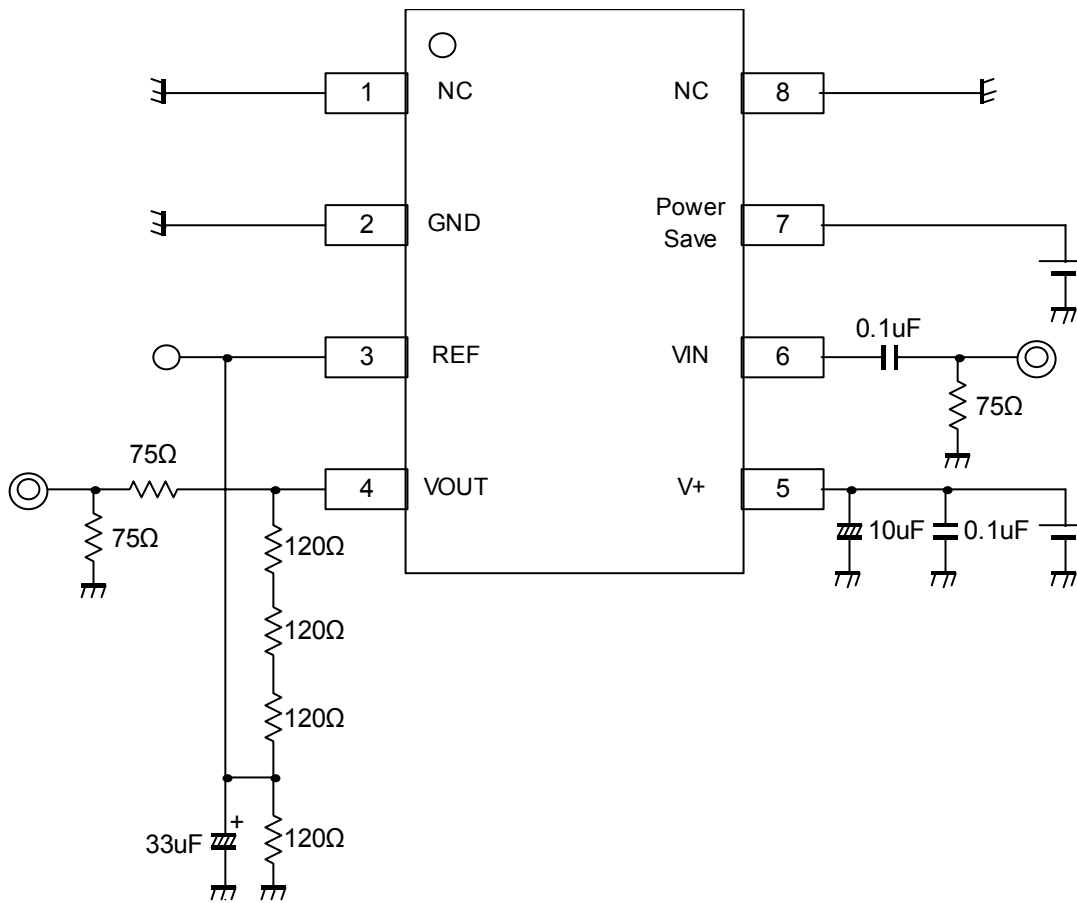
■ELECTRICAL CHARACTERISTICS 1(V⁺ =5V, RL= refer to test circuit, Ta=25°C)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|----------------------|---|------|------|----------------|------|
| Operating Voltage | Vopr | | 4.5 | 5.0 | 5.5 | V |
| Supply Current | I _{CC} | No signal | - | 9.0 | 12.0 | mA |
| Supply Current at Power Save Mode | I _{save} | Power save mode | - | 40 | 100 | uA |
| Power Supply Short-circuit Voltage | V _{oDCIN} | 75Ω series resistance connection | - | - | 16 | V |
| Output Terminal Voltage at Power Supply Short-circuit | V _{outDCIN} | 75Ω series resistance connection | - | - | 13.5 | V |
| REF Terminal Voltage 1 at Power Supply Short-circuit | V _{thREF1} | Power supply short-circuit protection OFF→ON | 1.2 | 1.5 | 1.8 | V |
| REF Terminal Voltage 2 at Power Supply Short-circuit | V _{thREF2} | Power supply short-circuit protection ON→OFF | 0.8 | 1.1 | 1.4 | V |
| Maximum Output Level | V _{om} | f=100kHz, THD=1%, sin-signal | 2.2 | 2.5 | - | Vp-p |
| Voltage Gain | G _v | V _{in} =100kHz,0.5Vp-p, sin-signal | 11.9 | 12.3 | 12.7 | dB |
| Low Pass Filter Characteristic | G _{fy4.5M} | V _{in} =4.5MHz/100kHz, 0.5Vp-p | -0.6 | -0.1 | 0.4 | dB |
| | G _{fy19M} | V _{in} =19MHz/100kHz, 0.5Vp-p | - | -32 | -22 | |
| Differential Gain | DG | V _{in} =0.5Vp-p, 10step video signal, RL=75Ω | - | 0.5 | - | % |
| Differential Phase | DP | V _{in} =0.5Vp-p, 10step video signal, RL=75Ω | - | 1.5 | - | deg |
| Output DC Voltage | V _{oDC} | No signal | - | 0.5 | 0.65 | V |
| SW Voltage High Level | V _{thPSH} | Power save terminal switch voltage | 1.8 | - | V ⁺ | V |
| SW Voltage Low Level | V _{thPSL} | Power save terminal switch voltage | 0 | - | 0.3 | |

■ CONTROL TERMINAL

| PARAMETER | STATUS | MODE |
|-------------------|--------|---------------------------------------|
| R E F | H | Power save: ON Non-Active mode (Mute) |
| | L | Power save: OFF Active mode (Mute) |
| P o w e r S a v e | H | Power save: OFF Active mode |
| | L | Power save: ON Non-Active mode (Mute) |
| | OPEN | Power save: ON Non-Active mode (Mute) |

■ TEST CIRCUIT

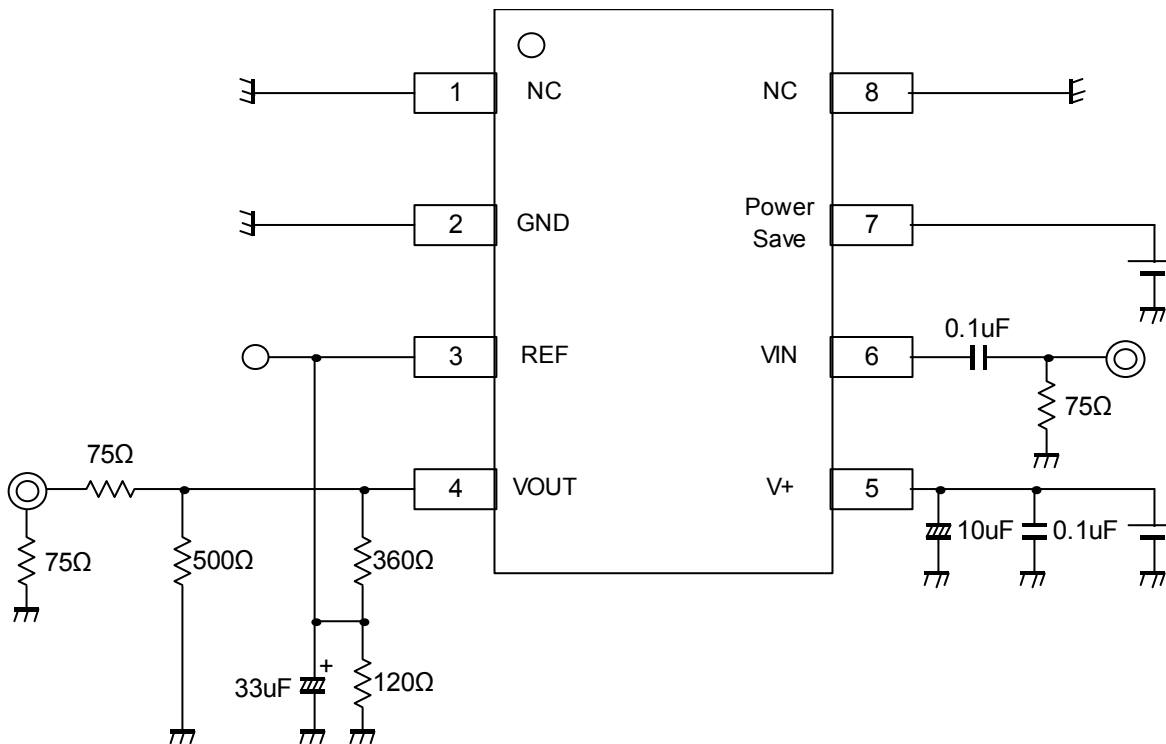


■ APPLICATION

Please connect the capacitor of power supply terminal (pin 5) near IC.
 DC coupling is recommended. Please do not connect the output coupling capacitor.
 External resistance must use power dissipation :125mW or more.
 When 120Ω x3 are replaced with 360Ω, 400mW or more is recommended.

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■ APPLICATION CIRCUIT: Power Supply Short-circuit for 18Vmax)



■ APPLICATION

Please connect the capacitor of power supply terminal (pin 5) near IC.

DC coupling is recommended. Please do not connect the output coupling capacitor.

The power dissipation of external resistance is as follows.

When the power supply short-circuit voltage is 18Vmax, the current that flows to each resistance is as follows.

- 75Ω (series resistance): about 60mA
- 360Ω, 120Ω (power supply short-circuit detection resistance): about 30mA
- 500Ω (pull-down resistance): about 30mA

The power dissipation recommendation value of each resistance is as follows.

- 75Ω (series resistance): 300mW or more
- 360Ω (power supply short-circuit detection resistance): 400mW or more
- 120Ω (power supply short-circuit detection resistance): 125mW or more
- 500Ω (pull-down resistance): 500mW or more

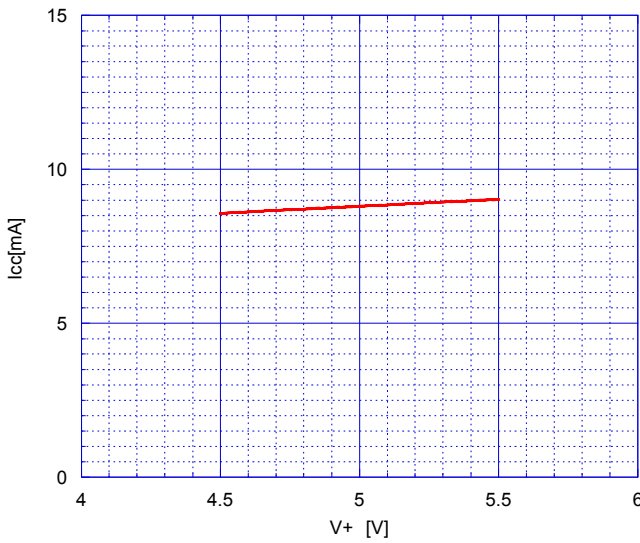
The load resistance of NJM2559 is about 93Ω in this application circuit.

Please use it more than 93Ω.

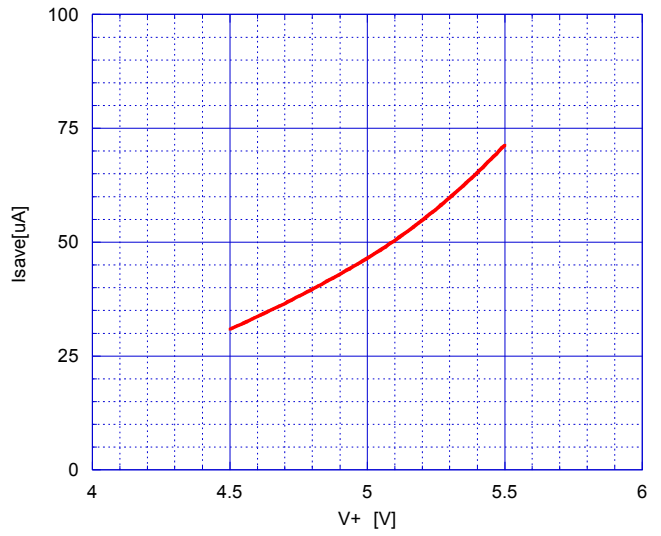
Moreover, supply current increases by 1mA when comparing with test circuit.

■ TYPICAL CHARACTERISTICS

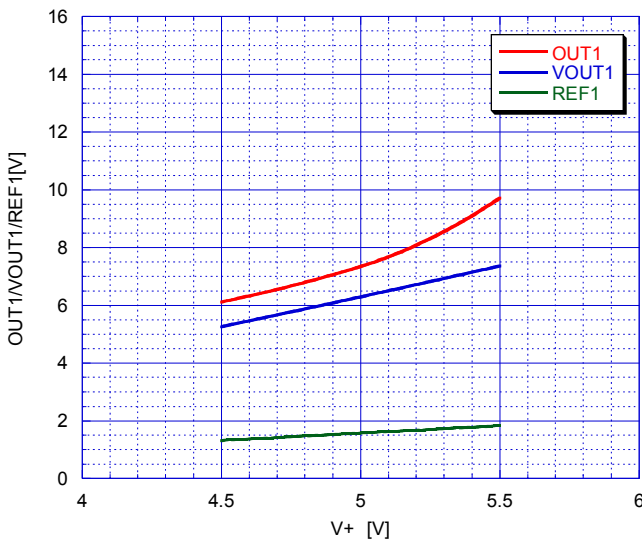
V+ vs I_{cc}



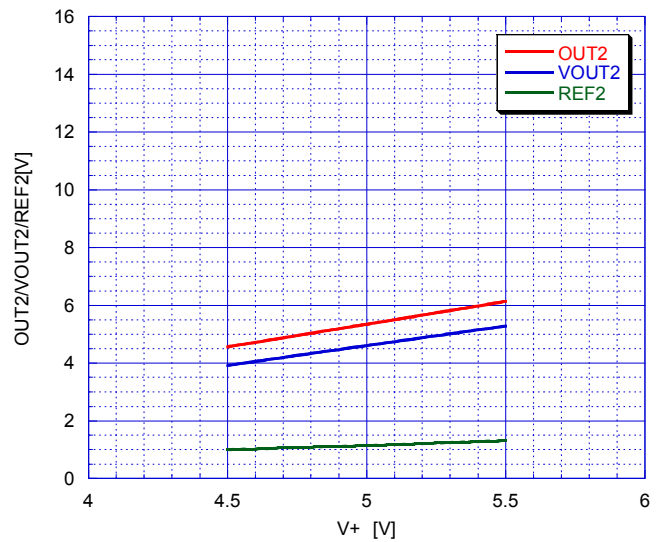
V+ vs I_{save}



V+ vs Protect Mode1



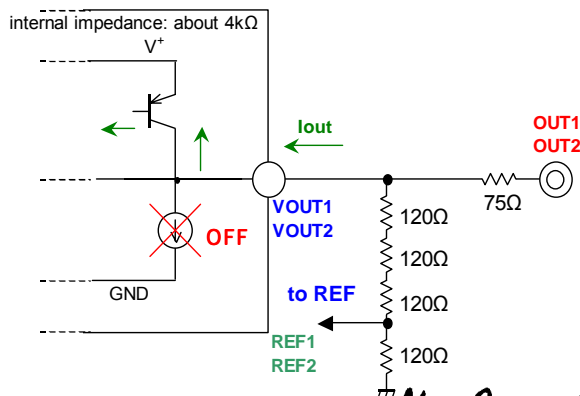
V+ vs Protect Mode2



Mode1: Power supply short-circuit protection OFF→ON
 The voltage is applied to OUT from 0V in the step of +0.1V.
 Each voltage when the voltage of VIN began to fall on Low is measured.

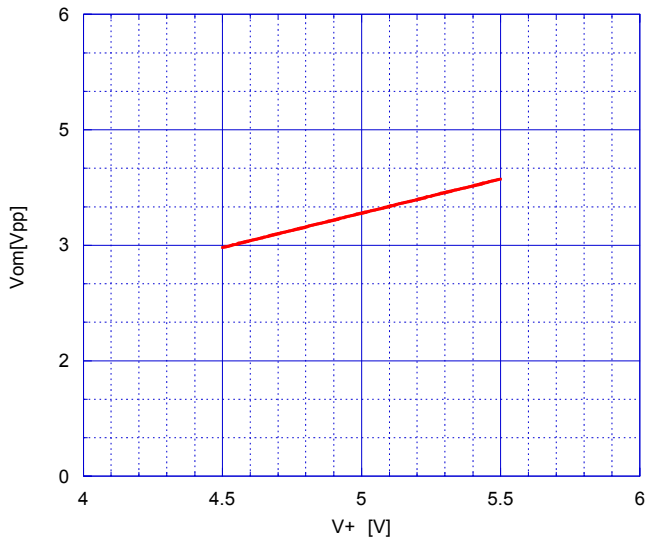
Mode2: Power supply short-circuit protection ON→OFF
 The voltage is applied to OUT from 16V in the step of -0.1V.
 Each voltage when the voltage of VIN becomes 1.4V is measured.

Power supply short-circuit protection

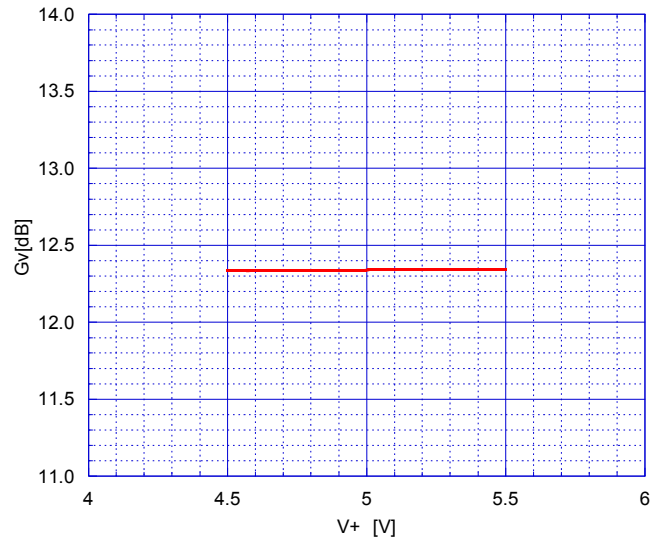


■ TYPICAL CHARACTERISTICS

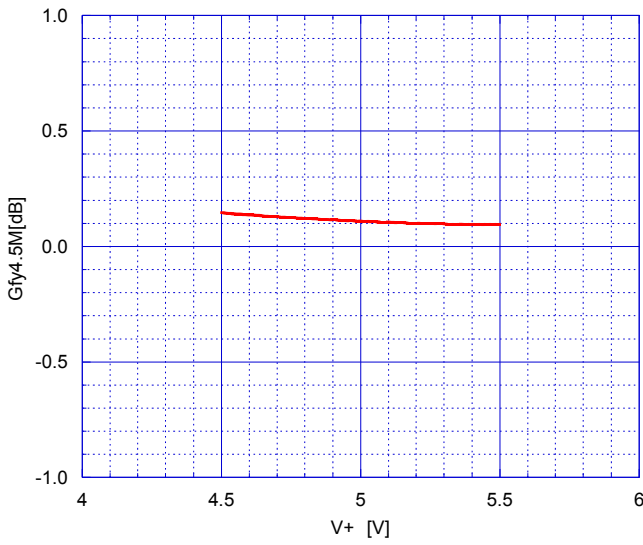
V+ vs Vom



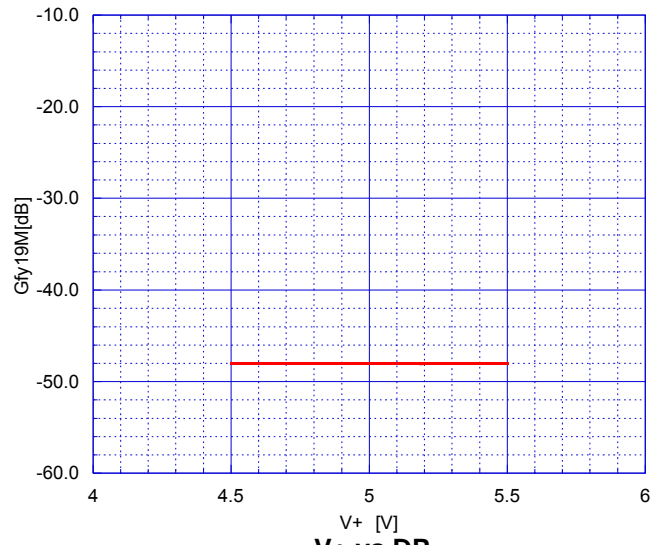
V+ vs Gv



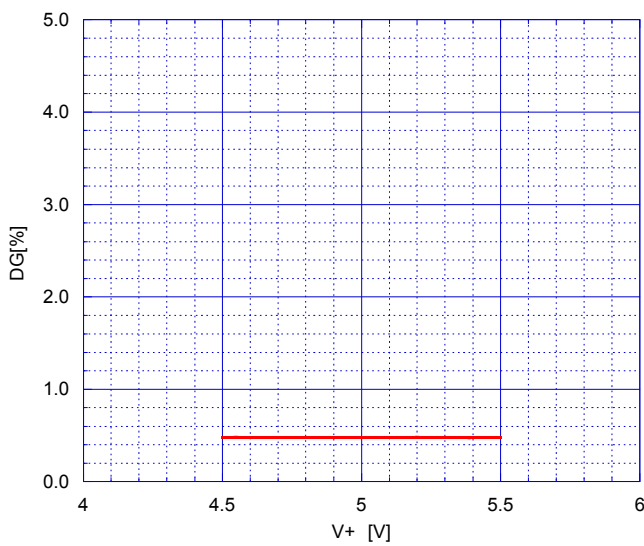
V+ vs Gfy4.5M



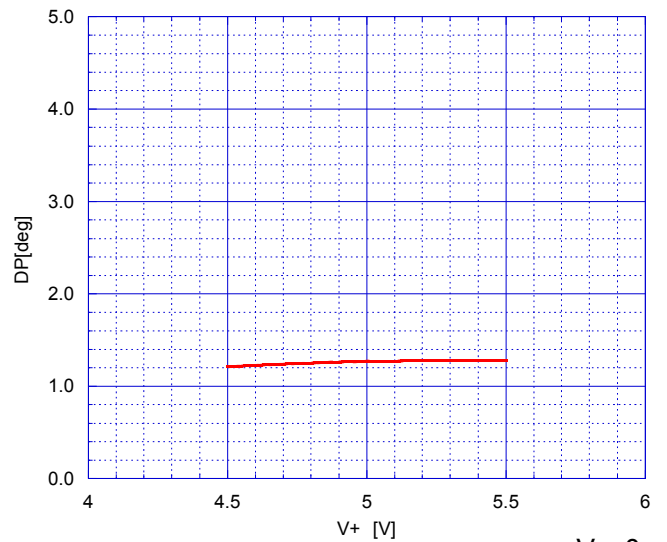
V+ vs Gfy19M



V+ vs DG



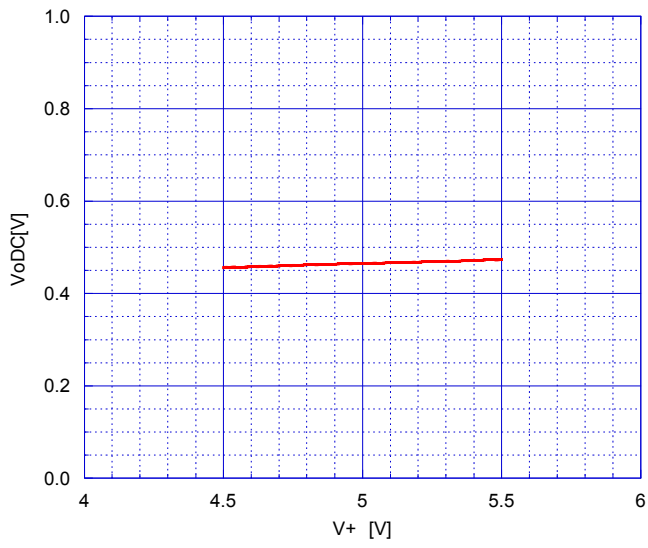
V+ vs DP



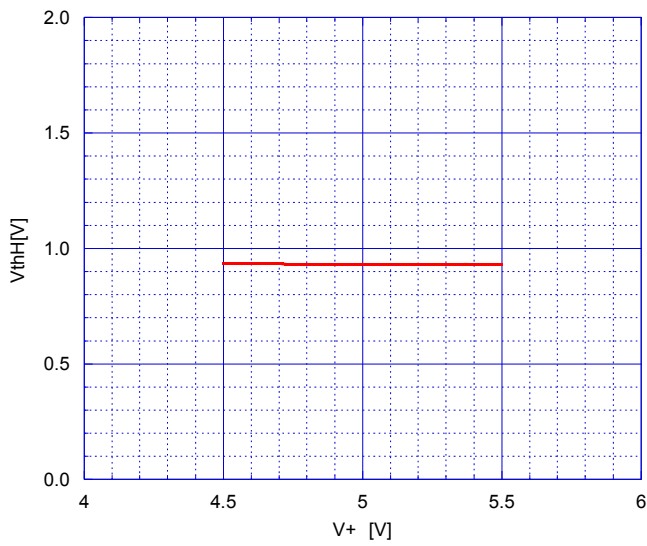
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■ TYPICAL CHARACTERISTICS

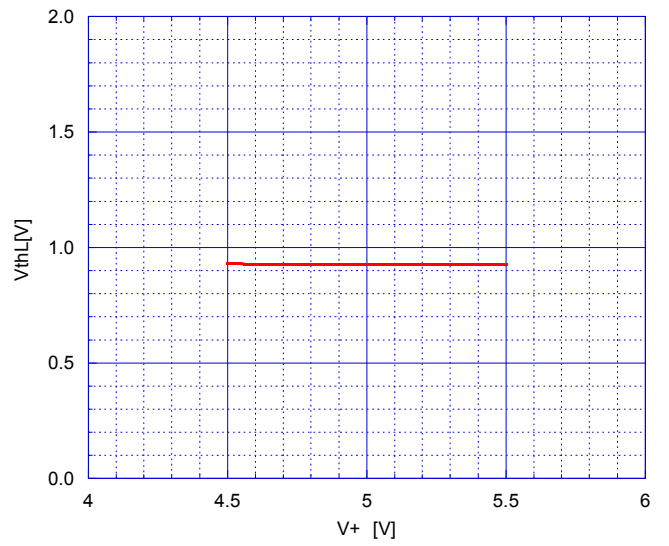
V+ vs VoDC



V+ vs VthH

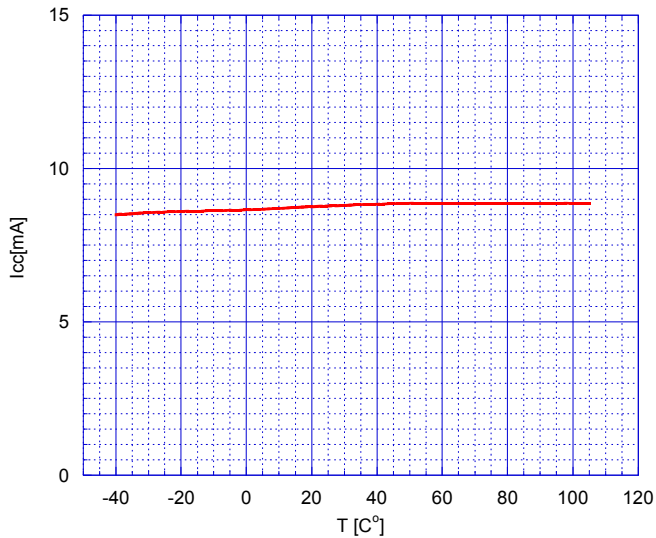


V+ vs VthL

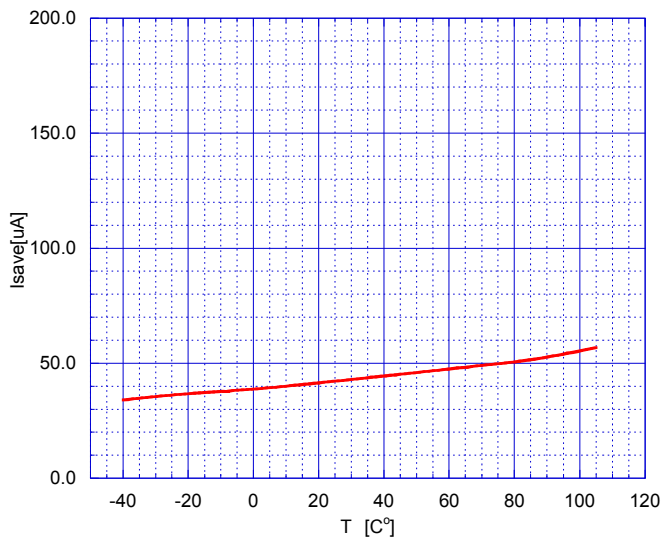


TYPICAL CHARACTERISTICS

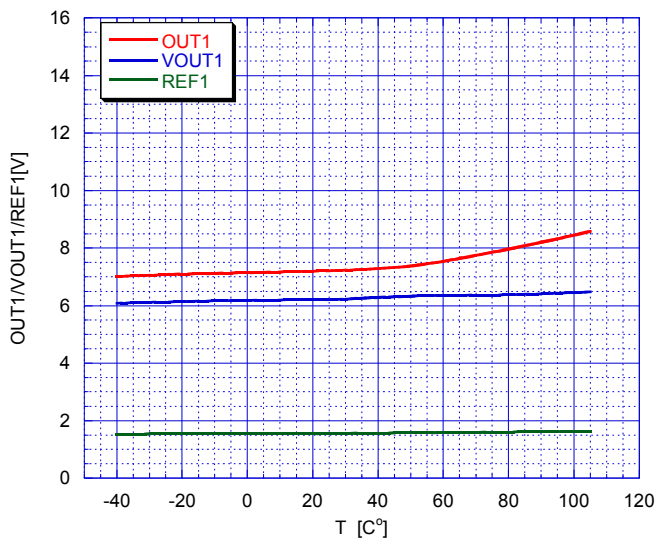
T vs Icc



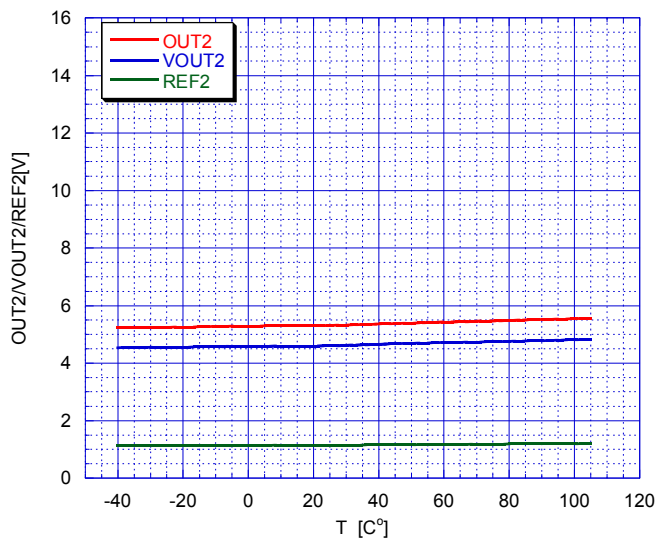
T vs Isave



T vs Protect Mode1



T vs Protect Mode2



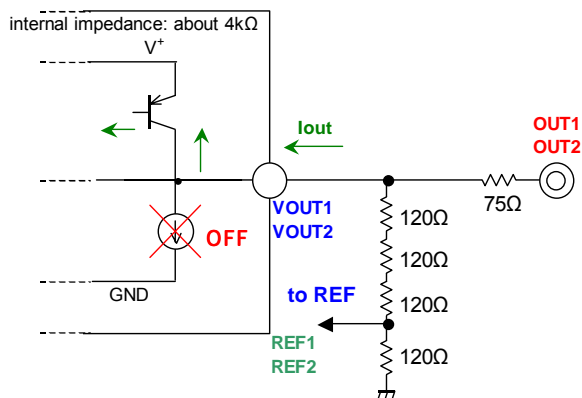
Mode1: Power supply short-circuit protection OFF→ON

The voltage is applied to OUT from 0V in the step of +0.1V. Each voltage when the voltage of V_{IN} began to fall on Low is measured.

Mode2: Power supply short-circuit protection ON→OFF

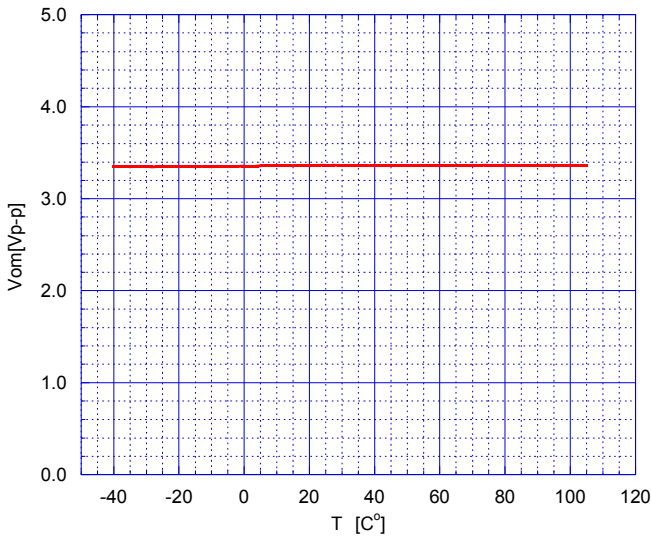
The voltage is applied to OUT from 16V in the step of -0.1V. Each voltage when the voltage of V_{IN} becomes 1.4V is measured.

Power supply short-circuit protection

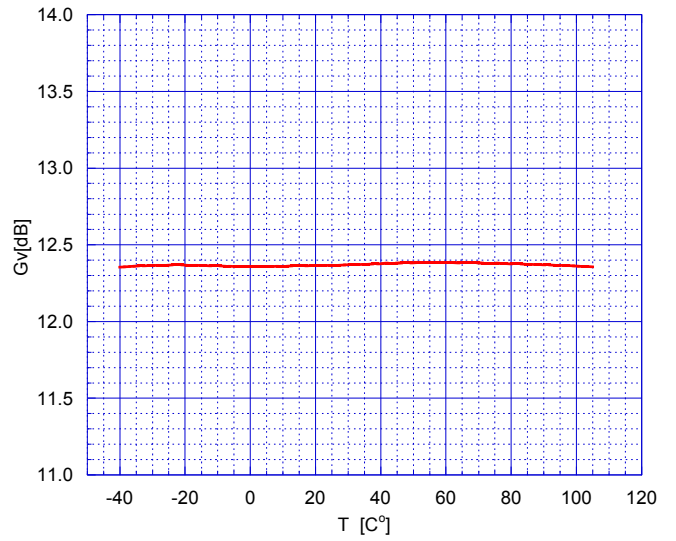


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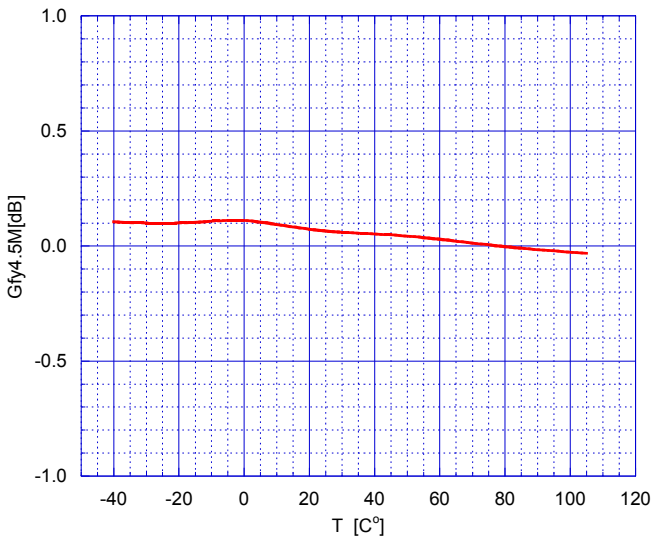
T vs Vom



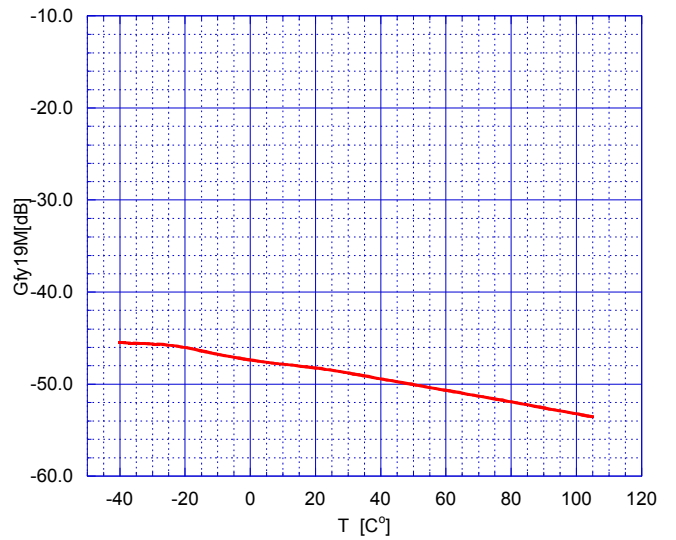
T vs Gv



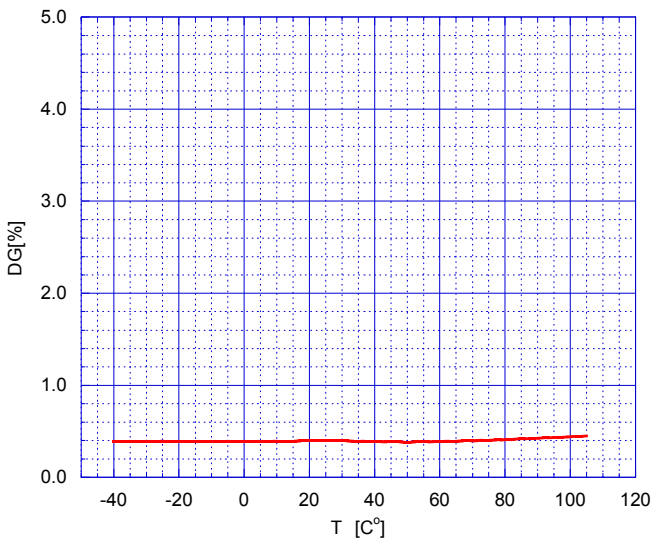
T vs Gfy4.5M



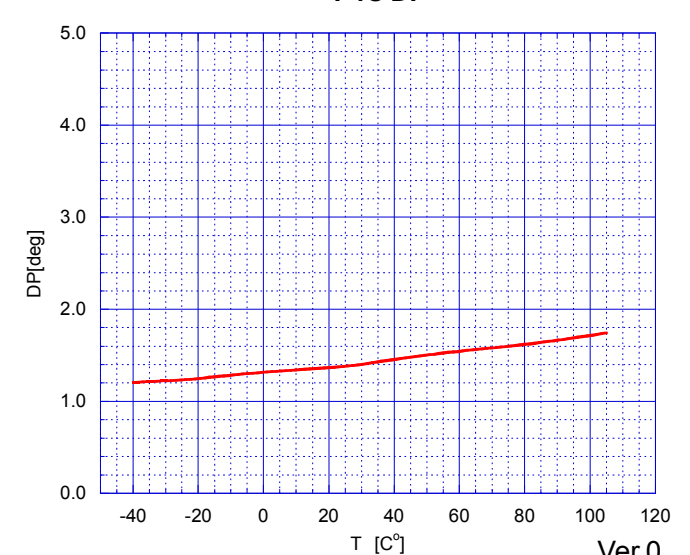
T vs Gfy19M



T vs DG



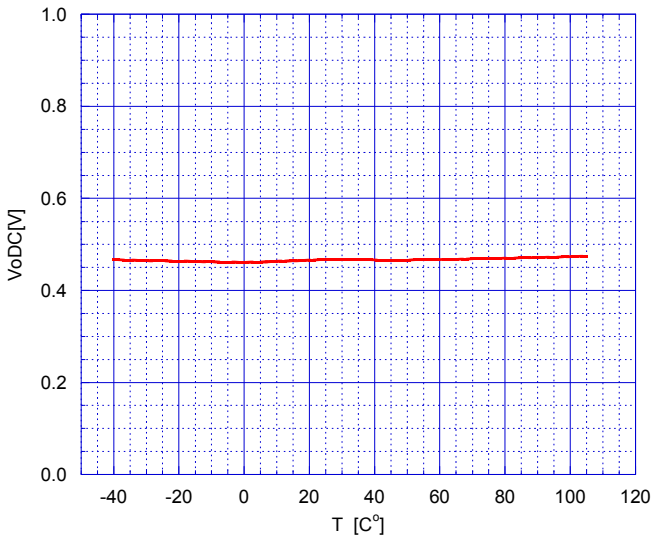
T vs DP



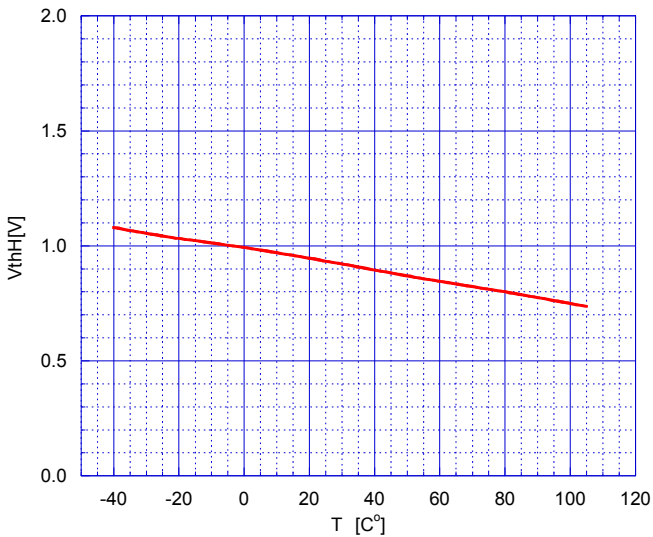
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■ TYPICAL CHARACTERISTICS

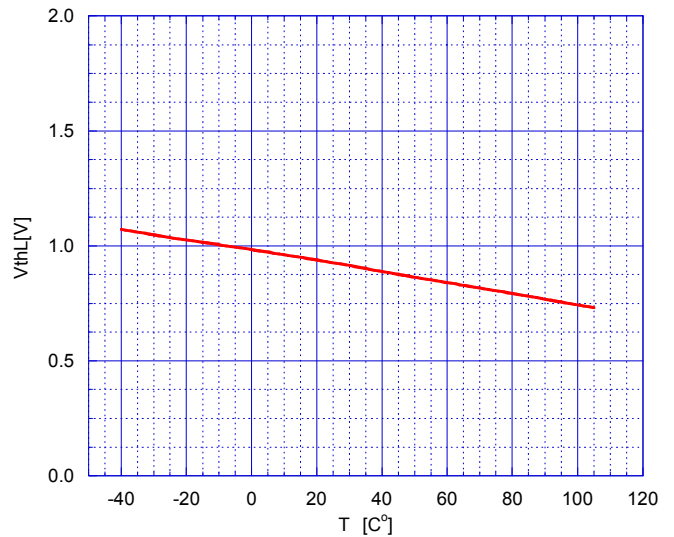
T vs VoDC



T vs VthH

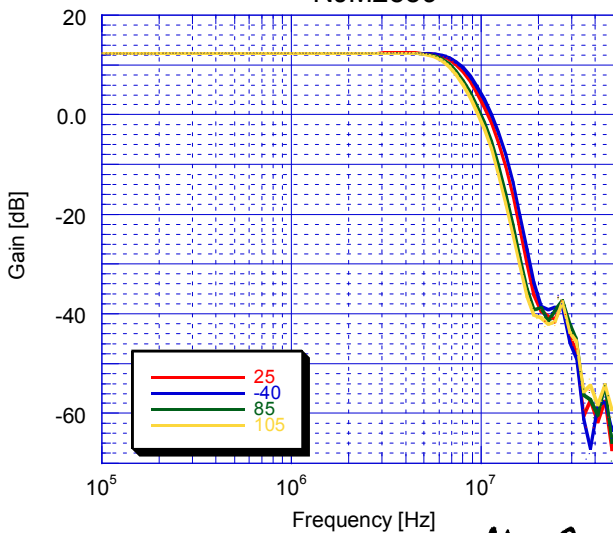


T vs VthL



Voltage Gain vs. Frequency

NJM2559



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