

DESCRIPTIONS

The IP9004A is a 5-CH motor driver for CD-P/VCDP/ DVDP systems. It is composed of 4-CH BTL driver and 1-CH forward/reverse controlled DC motor driver.



FEATURES

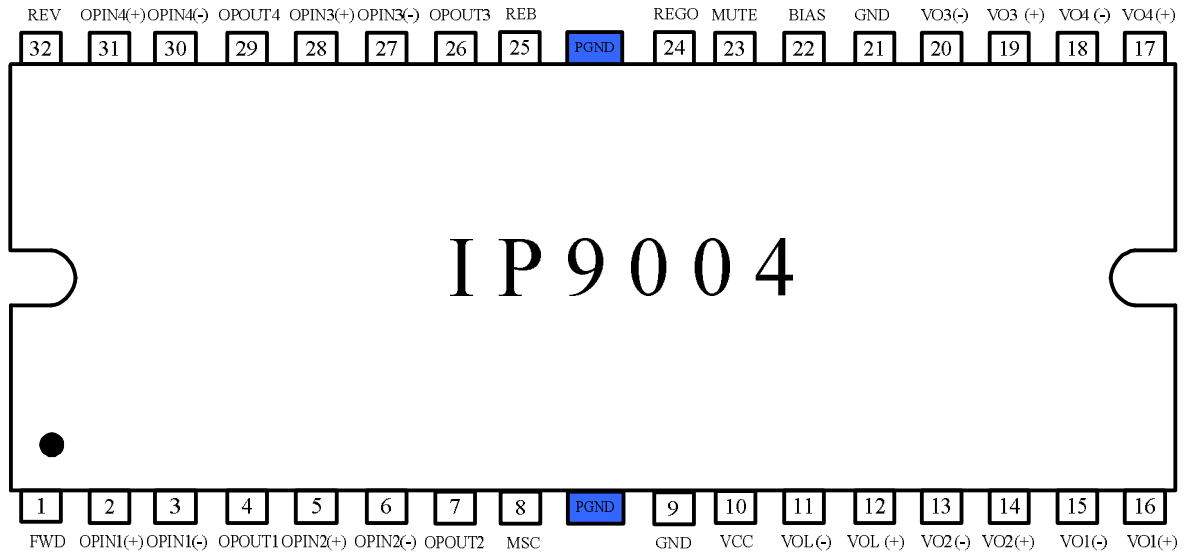
- 4-CH BTL(Balanced Transformerless) driver
- 1-CH forward/reverse controlled DC motor driver
- Built-in TSD (thermal shut down) circuit
- Built-in mute circuit
- Built-in MSC (motor speed control) circuit
- Built-in 5V regulator with an external PNP TR
- Operating supply voltage (4.5V~13.2V)

ORDER INFORMATION

| Device | Package | Operating Temp |
|-------------|---------|----------------|
| IP9004A | 32SSOPH | -35°C ~ +85°C |
| IP9004AL | 32SSOPH | -35°C ~ +85°C |
| IP9004A-TF | 32SSOPH | -35°C ~ +85°C |
| IP9004AL-TF | 32SSOPH | -35°C ~ +85°C |

- L : Lead Free products
- TF : Tape & Reel packing
- L-TF : Lead Free and Tape & Reel packing

PIN CONNECTIONS



PIN DESCRIPTIONS

| NO | SYMBOL | I/O | DESCRIPTION | NO | SYMBOL | I/O | DESCRIPTION |
|----|----------|-----|------------------------|----|----------|-----|------------------------|
| 1 | FWD | I | Forward Input | 17 | Vo4(+) | O | CH4 OUPUT(-) |
| 2 | OPIN1(+) | I | CH1 OP-AMP Input (+) | 18 | Vo4(-) | O | CH4 OUPUT(+) |
| 3 | OPIN1(-) | I | CH1 OP-AMP Input (-) | 19 | Vo3(+) | O | CH3 OUPUT(-) |
| 4 | OPOUT1 | O | CH1 OP-AMP Output | 20 | Vo3(-) | O | CH3 OUPUT(+) |
| 5 | OPIN2(+) | I | CH2 OP-AMP Input (+) | 21 | GND | - | GROUND |
| 6 | OPIN2(-) | I | CH2 OP-AMP Input (-) | 22 | BIAS | I | BIAS |
| 7 | OPOUT2 | O | CH2 OP-AMP Output | 23 | MUTE | I | MUTE |
| 8 | MSC | I | MOTOR SPEED CONTROL | 24 | REGO | O | REGULATOR OUTPUT |
| 9 | GND | - | GROUND | 25 | REB | O | REGULATOR BASE |
| 10 | Vcc | I | Supply Voltage | 26 | OPOUT3 | O | CH3 OP-AMP Output |
| 11 | VoL(-) | O | LOADING OUPUT(-) | 27 | OPIN3(-) | I | CH3 OP-AMP Input (-) |
| 12 | VoL(+) | O | LOADING OUPUT(+) | 28 | OPIN3(+) | I | CH3 OP-AMP Input (+) |
| 13 | Vo2(-) | O | CH2 OUPUT(-) | 29 | OPOUT4 | O | CH4 OP-AMP Output |
| 14 | Vo2(+) | O | CH2 OUPUT(+) | 30 | OPIN4(-) | I | CH4 OP-AMP Input (-) |
| 15 | Vo1(-) | O | CH1 OUPUT(-) | 31 | OPIN4(+) | I | CH4 OP-AMP Input (+) |
| 16 | Vo1(+) | O | CH1 OUPUT(+) | 32 | REV | I | Reverse Input |

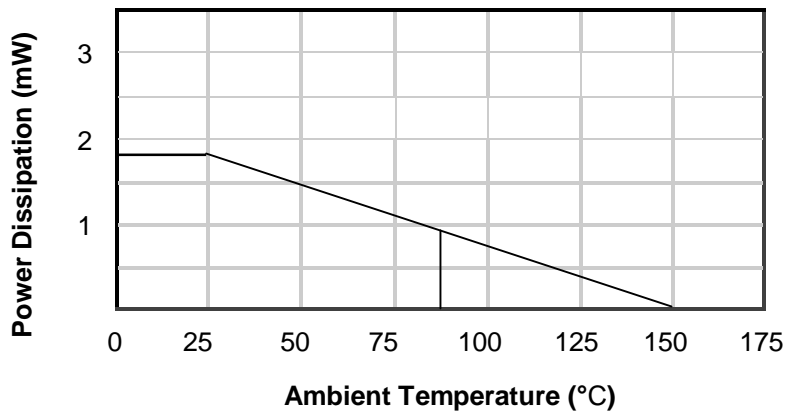
ABSOLUTE MAXIMUM RATINGS

| CHARACTERISTICS | SYMBOL | VALUE | UNIT |
|------------------------|--------|-----------|------|
| Maximum supply voltage | VCCmax | 15 | V |
| Power dissipation | Pd | 1.8 * | W |
| Operating temperature | Topr | -35 ~ +85 | °C |
| Storage temperature | Tstg | -55 ~ 150 | °C |

Note>

1. When mounted on 50mm X 50mm X 1mm PCB (Phenolic resin material).
2. Power dissipation reduces 14.4 mW/°C for using above Ta=25°C
3. Do not exceed Pd and SOA.

POWER DISSIPATION CURVE



RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTICS | SYMBOL | VALUE | UNIT |
|-----------------|--------|-------------|------|
| Supply Voltage | VCC | *4.5 ~ 13.2 | V |

* Supply voltage **must be larger than** 6.0V, when 5.0V regulator **is** used.

ELECTRICAL CHARACTERISTICS

(VCC=8V, RL = 12ohm, Ta = 25°C unless otherwise specified.)

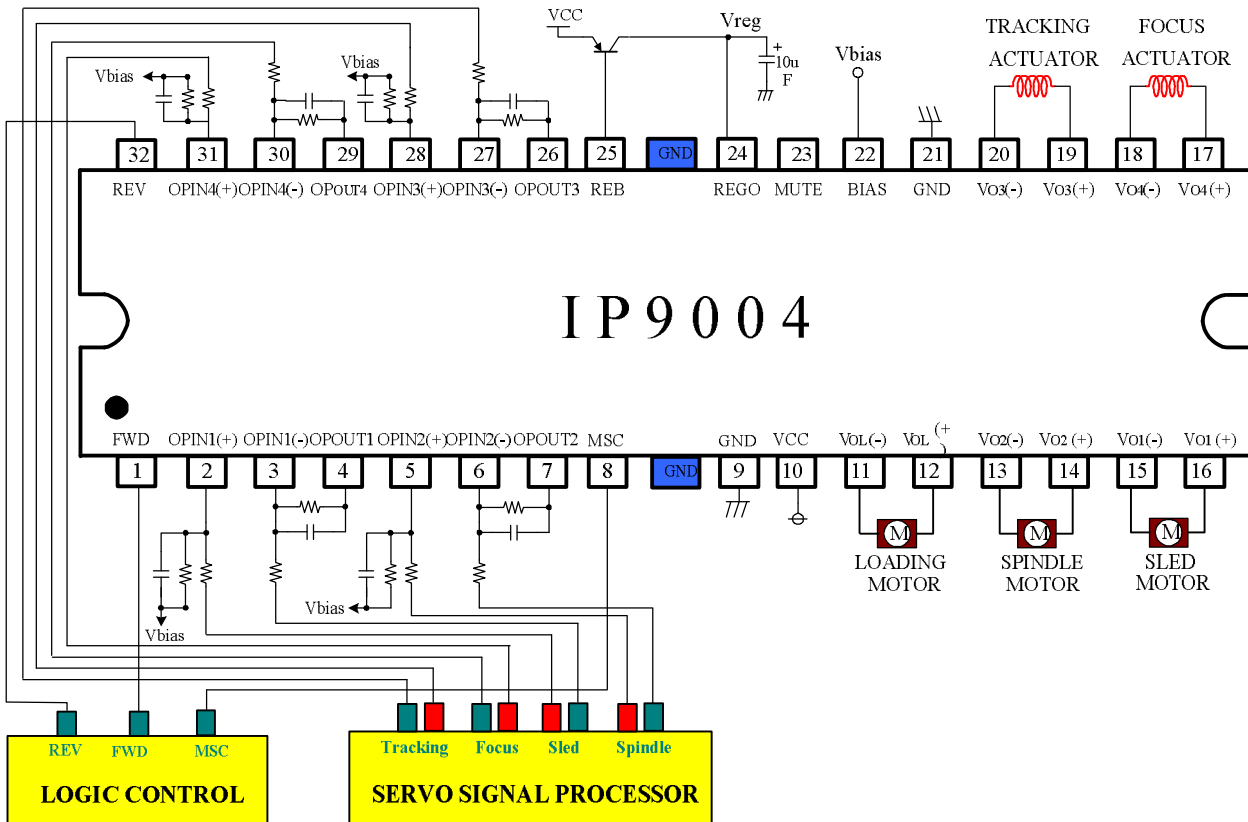
| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------|------------------|--------------------------------------|-----|-----|-----|------|
| Quiescent circuit current | Icc | No Load | - | 24 | - | mA |
| Mute on voltage | Vmon | Pin23=Variable | - | - | 0.5 | V |
| Mute off voltage | Vmoff | Pin23=Variable | 1.5 | - | - | V |
| [BTL DRIVER PART] | | | | | | |
| Output offset voltage | Voo | | -80 | 0 | 80 | mV |
| Maximum output voltage | Vom | RL=12ohm | 4.7 | 5.3 | - | V |
| Voltage gain | Gvc | Vin=0.1Vrms, f=1Khz | 14 | 16 | 18 | dB |
| Ripple rejection ratio | RR | Vin=0.1Vrms, f=120Hz | 50 | 60 | - | dB |
| Slew rate | SR | Vout=4Vp-p, square | - | 1.5 | - | V/us |
| [INPUT OPAMP CIRCUIT] | | | | | | |
| Common Mode Input Range | VICM | - | 0.5 | - | 6.8 | V |
| High level output voltage | VOHOP | - | 7.0 | - | - | V |
| Low level output voltage | VOLOP | - | - | - | 0.5 | V |
| Output sink current | ISINK | RVcc=50ohm | 1 | - | - | mA |
| Output source current | ISOU | RGND=50ohm | 1 | - | - | mA |
| [LOADING DRIVER PART] | | | | | | |
| Input high level voltage | Vih | - | 2 | - | - | V |
| Input high level voltage | Vil | - | - | - | 0.5 | V |
| Output voltage | Vo | RL=45ohm, Pin8=open | 5.4 | 6.0 | - | V |
| Output voltage regulation | Vo | RL=45ohm, $\Delta V_{Pin8}=1.0 V$ | 2 | 2.5 | 3 | V |
| Output offset voltage 1 | ΔV_{oo1} | Pin1, Pin32=5V | -80 | - | +80 | mV |
| Output offset voltage 2 | Voo2 | Pin1, Pin32=0V | -80 | - | +80 | mV |

ELECTRICAL CHARACTERISTICS

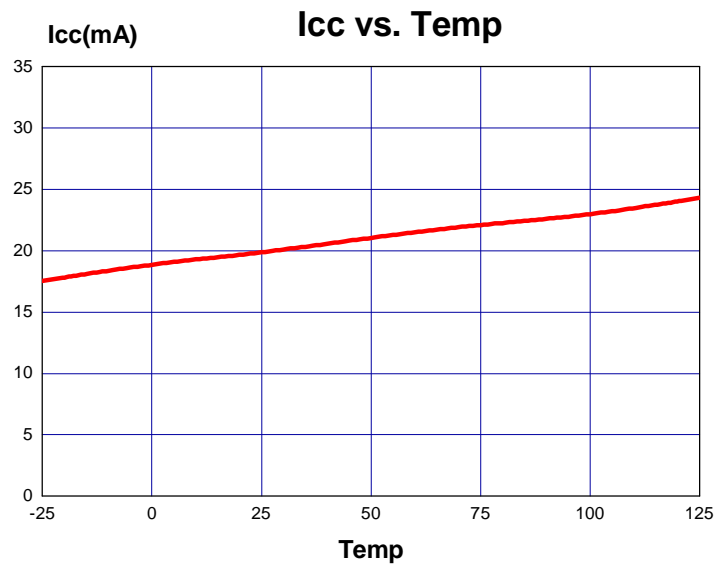
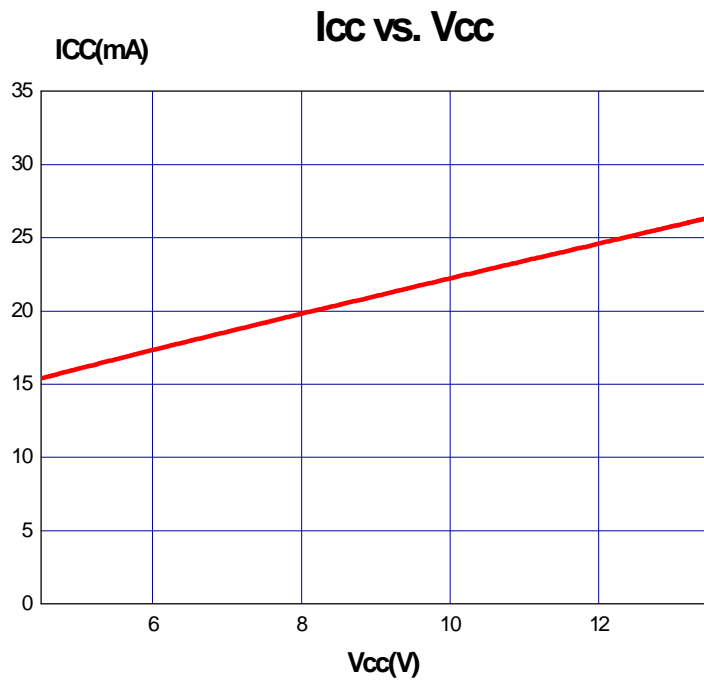
(VCC=8V, RL = 8ohm, Ta = 25°C unless otherwise specified.)

| CHARACTERISTICS | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------|-----------------|---------------------|-----|-----|-----|------|
| [REGULATOR PART] | | | | | | |
| Output voltage | VREG | IL=100mA | 4.7 | 5.0 | 5.3 | V |
| Load Regulation | ΔV_{om} | IL=0->200mA | -50 | 0 | 50 | mV |
| Line Regulation | ΔV_{cc} | Vcc=6->10V,IL=100mA | -60 | 0 | 60 | mV |

TYPICAL APPLICATION CIRCUIT

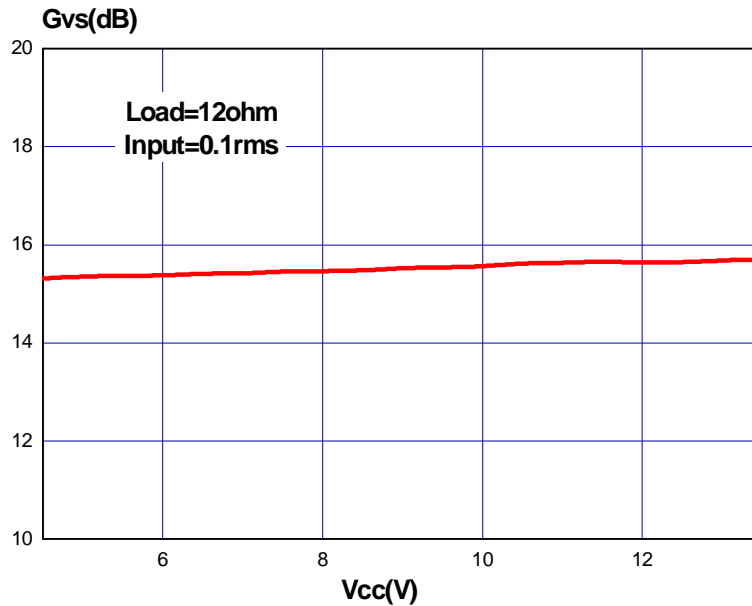


ELECTRICAL CHARACTERISTICS CURVES

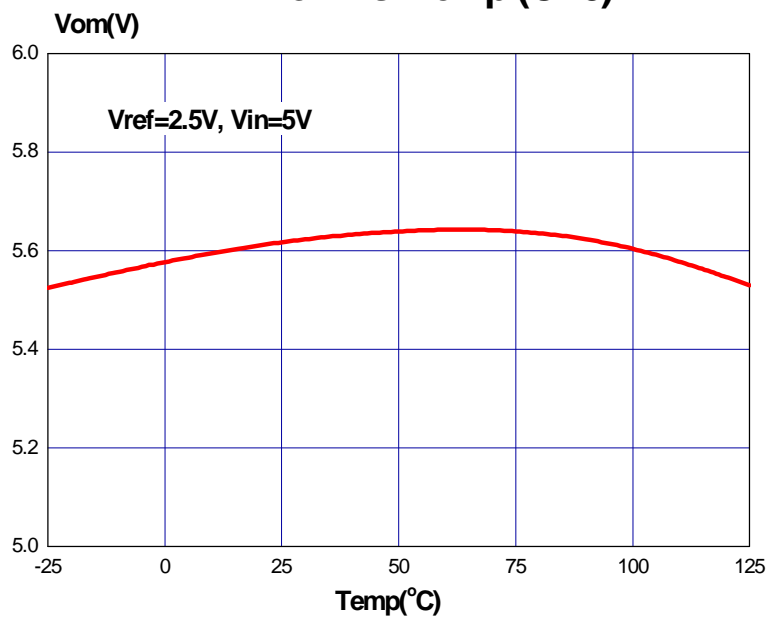


ELECTRICAL CHARACTERISTICS CURVES (Continued)

Gvs vs. Vcc (CH3)

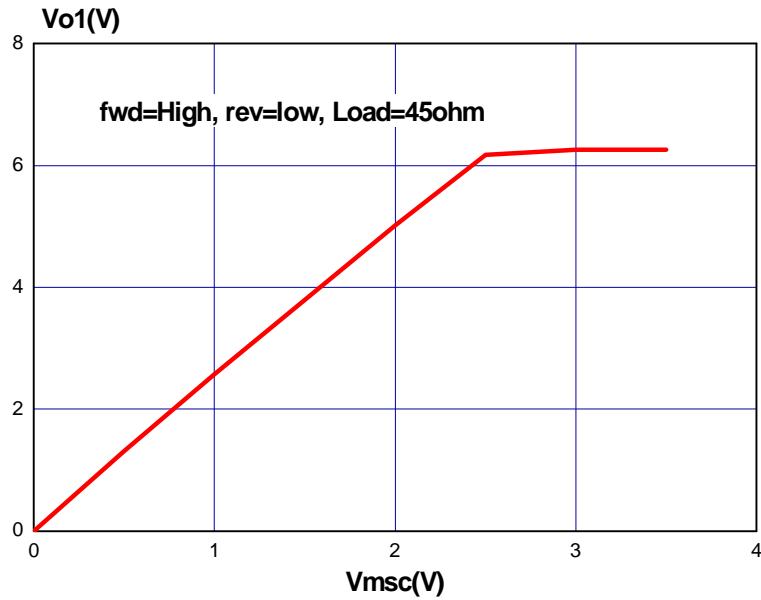


Vom vs. Temp (CH3)

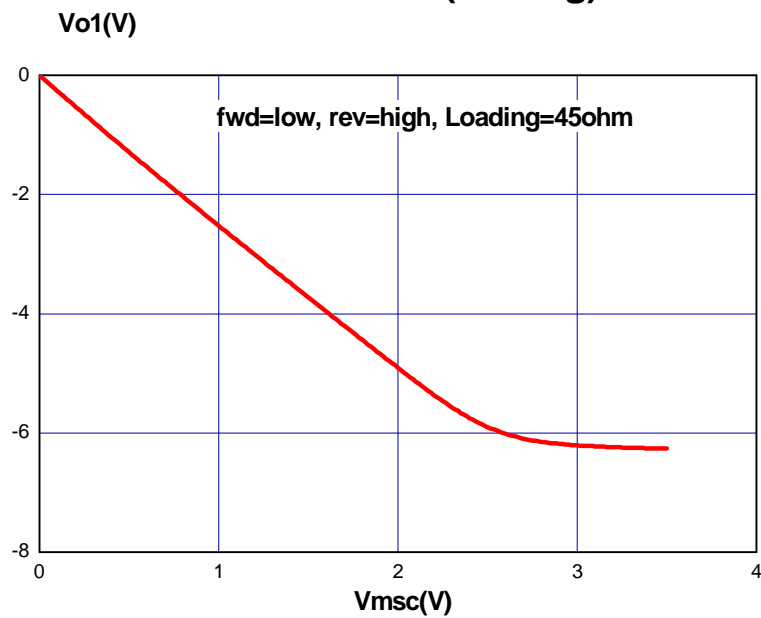


ELECTRICAL CHARACTERISTICS CURVES (Continued)

Vo1 vs. Vm_{sc} (loading)

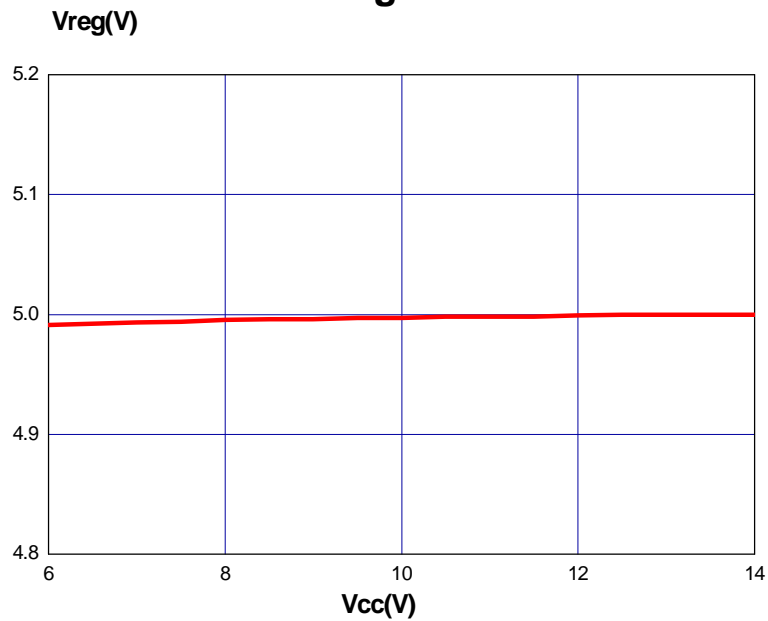


Vo1 vs. Vm_{sc}(loading)

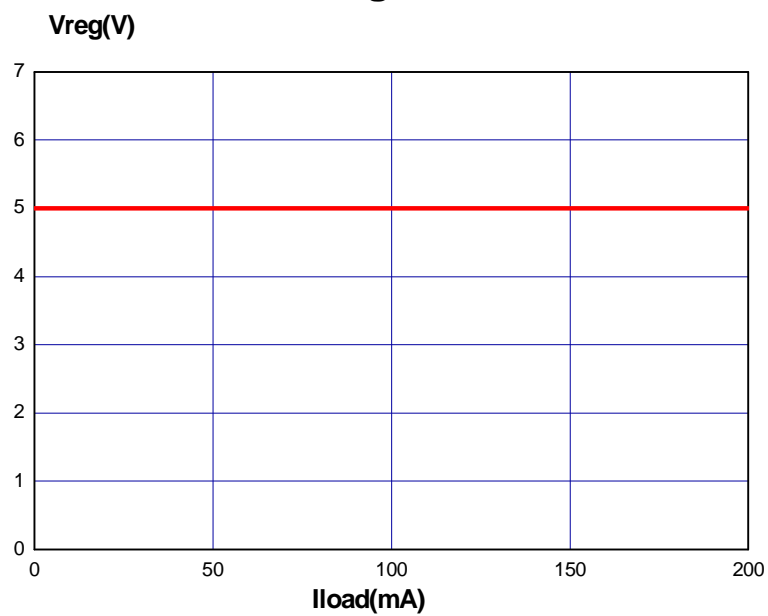


ELECTRICAL CHARACTERISTICS CURVES (Continued)

Vreg vs. Vcc



Vreg vs. Iload



ELECTRICAL CHARACTERISTICS CURVES (Continued)

