# BCoo ot r
# Contro r n ot on tor
# AD

## FEATURES

- Monitors two analog voltages or thermistor temperature inputs
- One on-chip and up to two remote temperature sensors with series resistance cancellation
- Controls and monitors the speed of up to two fans
- Automatic fan speed control mode controls system cooling based on measured temperature
- Enhanced acoustic mode dramatically reduces user

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ADT7466/D

## EC F CA

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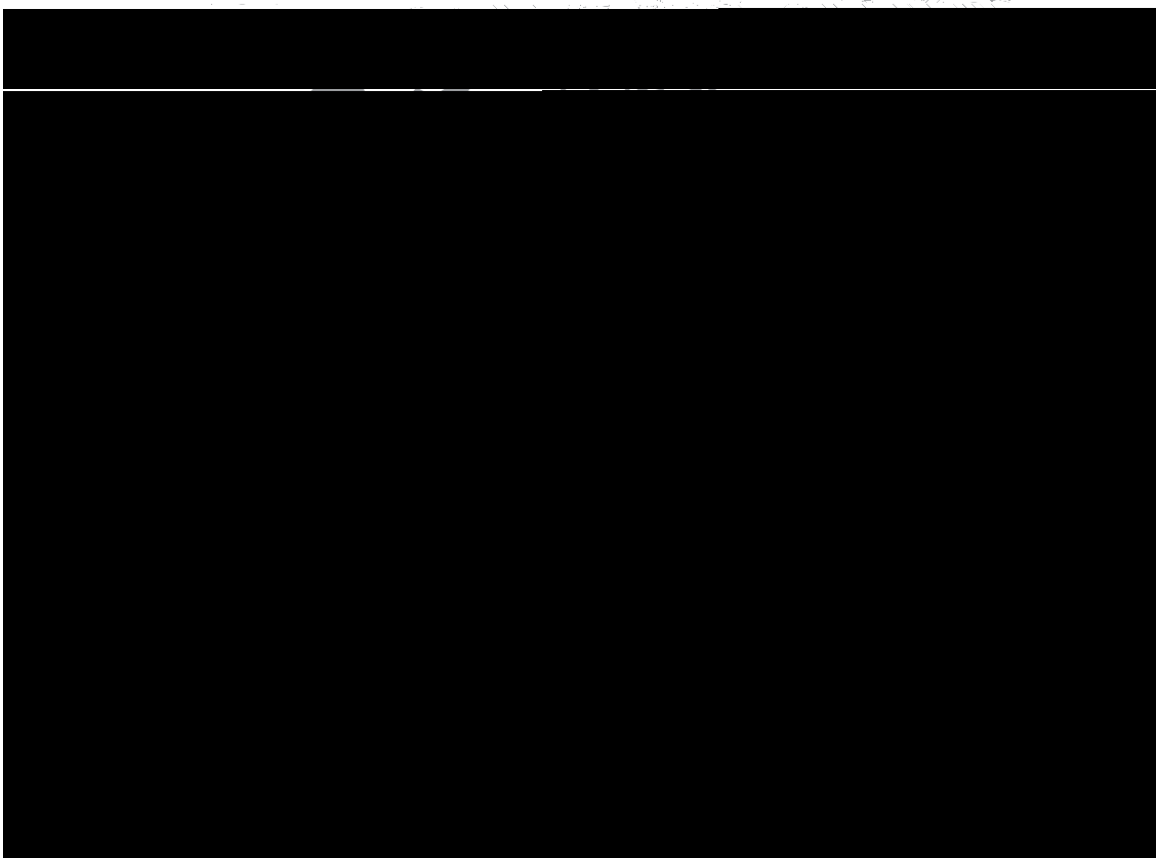
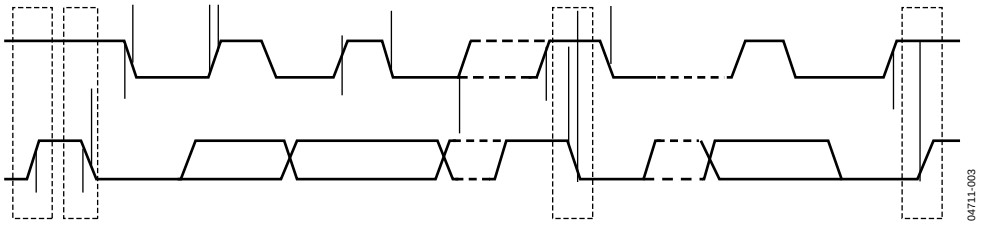
b

| Parameter | Min | Typ | Max | Unit | Test Conditions/Comments |
|---|---|---|---|---|---|
| POWER SUPPLY | | | | | |



| Parameter | Min | Typ | Max | Unit | Test Conditions/Comments |
|---|---|---|---|---|---|
| DRIVE OUTPUTS (DRIVE1, DRIVE2) | | | | | |
| Output Voltage Range | | 0–2.2 | | V | Digital input = 0x00 to 0xFF |
| Output Source Current | | 2 | | mA | |
| Output Sink Current | | 0.5 | | mA | |
| DAC Resolution | 8 | | | Bits | |
| Monotonicity | 8 | | | Bits | |
| Differential Nonlinearity | | | ±1 | LSB | |
| Integral Nonlinearity | | ±1 | | LSB | |
| Total Unadjusted Error | | | ±5 | % | $I_L$ = 2 mA |
| REFERENCE VOLTAGE OUTPUT (REFOUT) | | | | | |
| Output Voltage | 2.226 | 2.25 | 2.288 | V | |
| Output Source Current | | | 10 | mA | |
| Output Sink Current | | | 0.6 | mA | |
| OPEN-DRAIN SERIAL DATA BUS OUTPUT (SDA) | | | | | |
| Output Low Voltage ($V_{OL}$) | | | 0.4 | V | $I_{OUT}$ = −4.0 mA, $V_{CC}$ = 3.3 V |
| High Level Output Current ($I_{OH}$) | | 0.1 | 1 | µA | $V_{OUT}$ = $V_{CC}$ |
| DIGITAL INPUTS (SCL, SDA, TACH INPUTS, PROCHOT) | | | | | |
| Input High Voltage ($V_{IH}$) | 2.0 | | | V | |
| Input Low Voltage ($V_{IL}$) | | | 0.8 | V | |
| Hysteresis | | 0.5 | | V | |
| DIGITAL INPUT CURRENT (TACH INPUTS, PROCH | [redacted] | | | | |

## SERIAL BUS TIMING




NOT RECOMMENDED FOR NEW DESIGN

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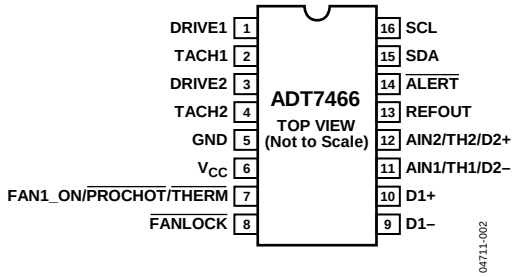
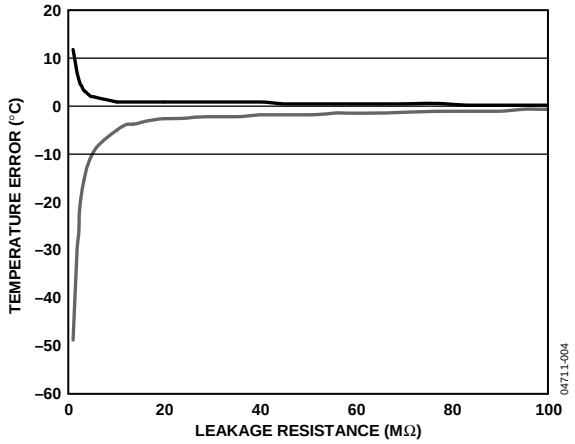



*Figure 3. Pin Configuration*

Rev. 3 | Page 7 of 48 | www.onsemi.com

Y CA E F ACE C A AC E C

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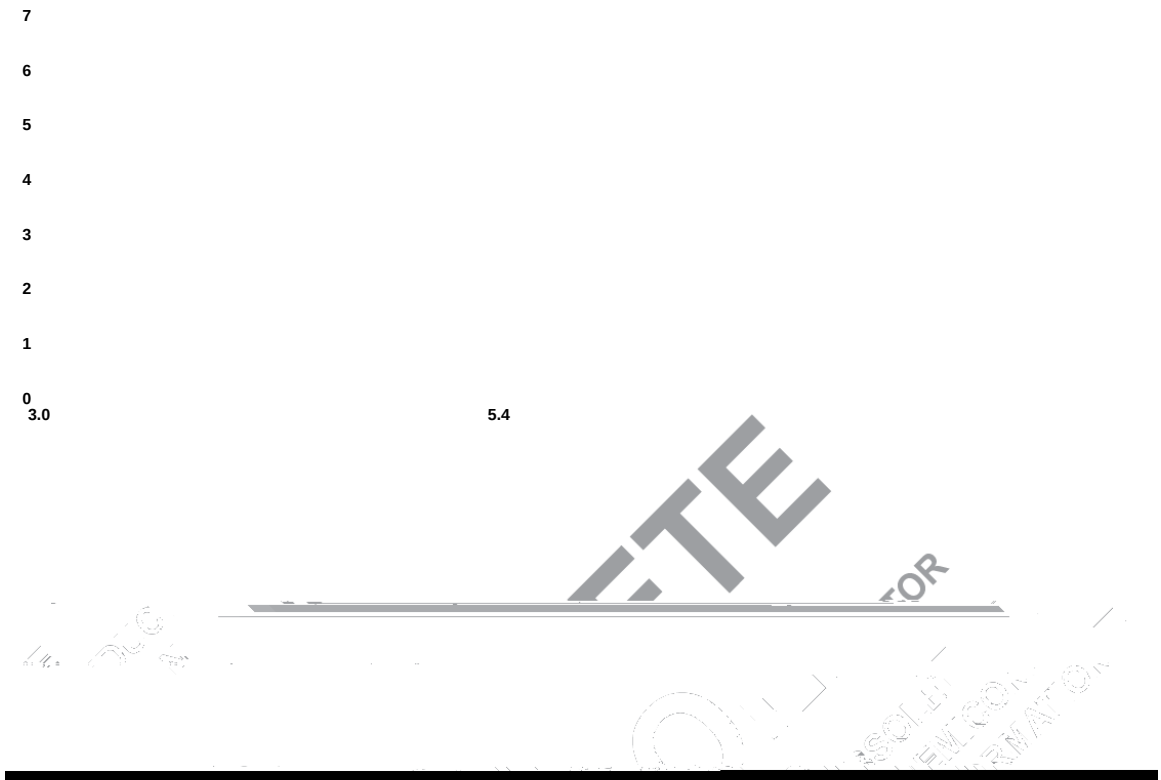
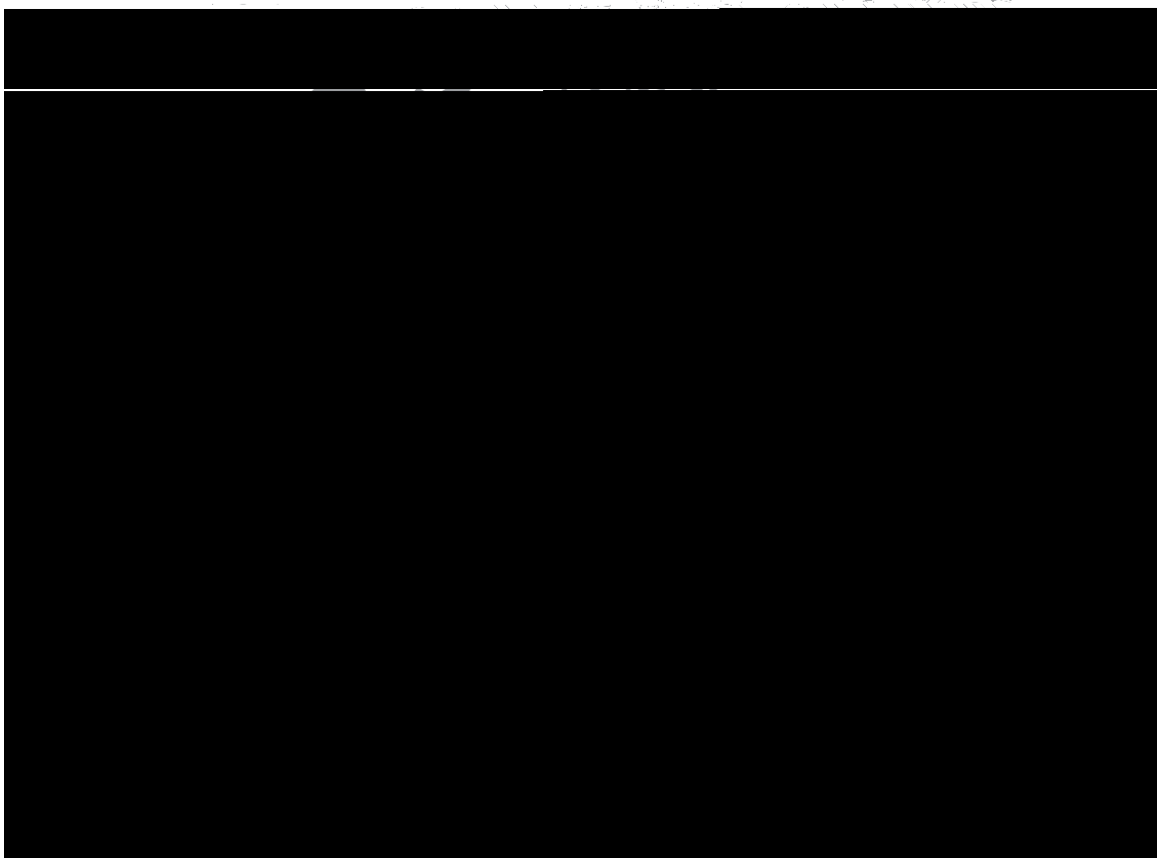
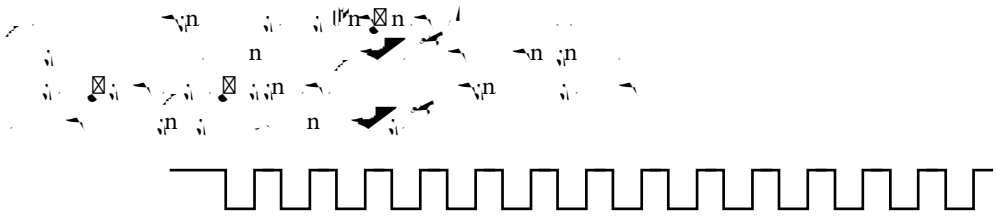

7
6
5
4
3
2
1
0
3.0
5.4





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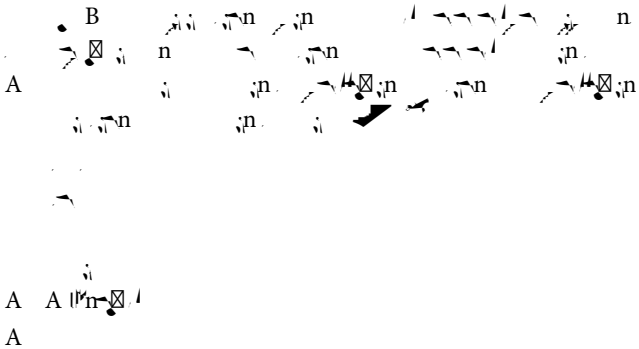
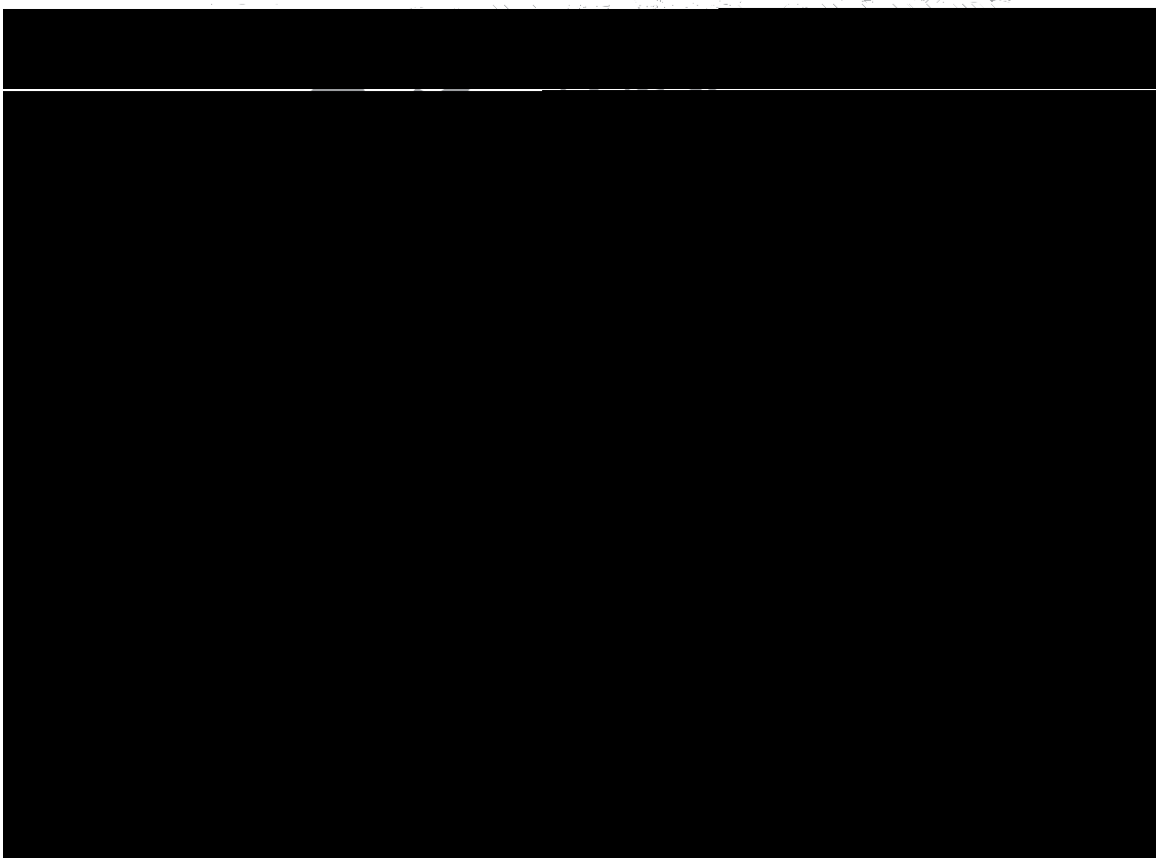
## WRITE AND READ OPERATIONS



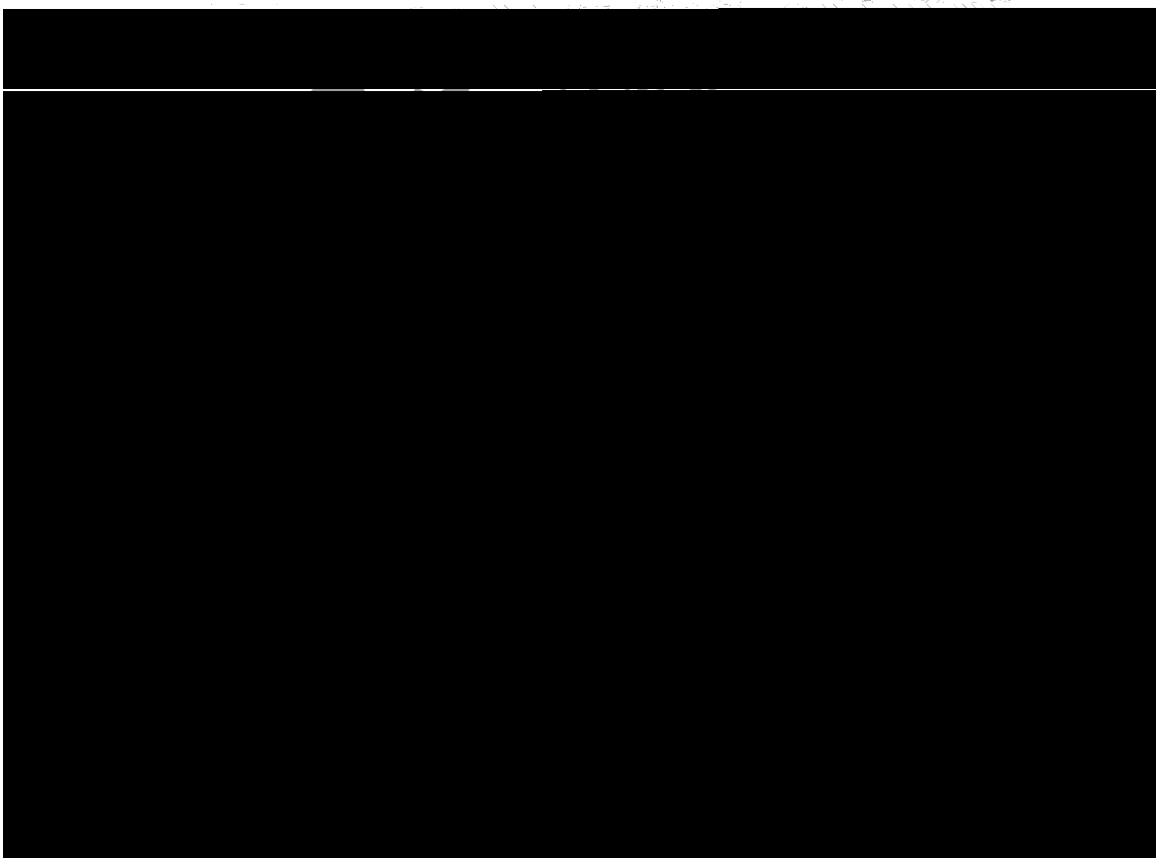




| Bits 2:0, Reg. 0x03 | Channel Selected |
|---|---|
| 000 | AIN1 |
| 001 | AIN2 |
| 010 | $V_{CC}$ |

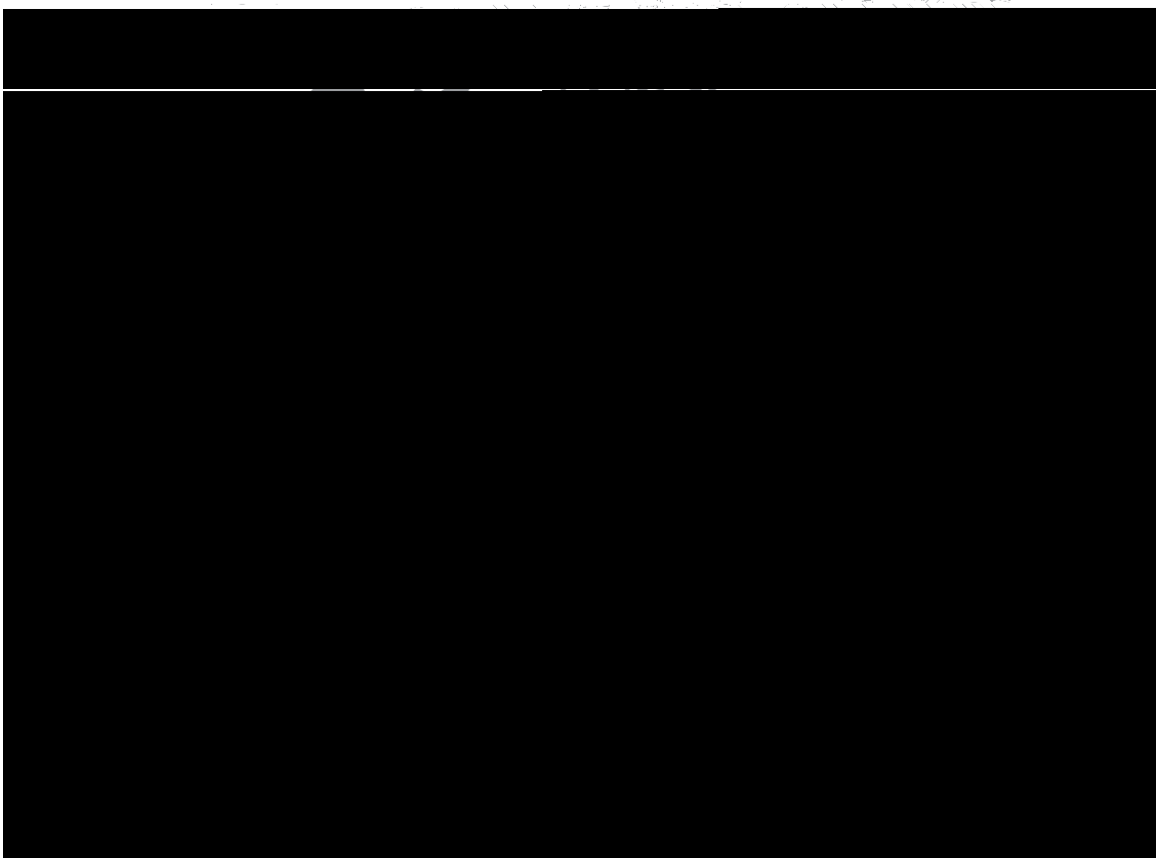
## REFERENCE VOLTAGE OUTPUT

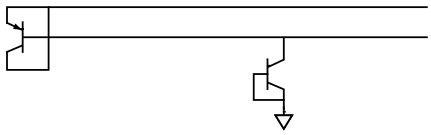
## CONFIGURATION OF PIN 11 AND PIN 12



## TEMPERATURE MEASUREMENT

## SERIES RESISTANCE CANCELLATION





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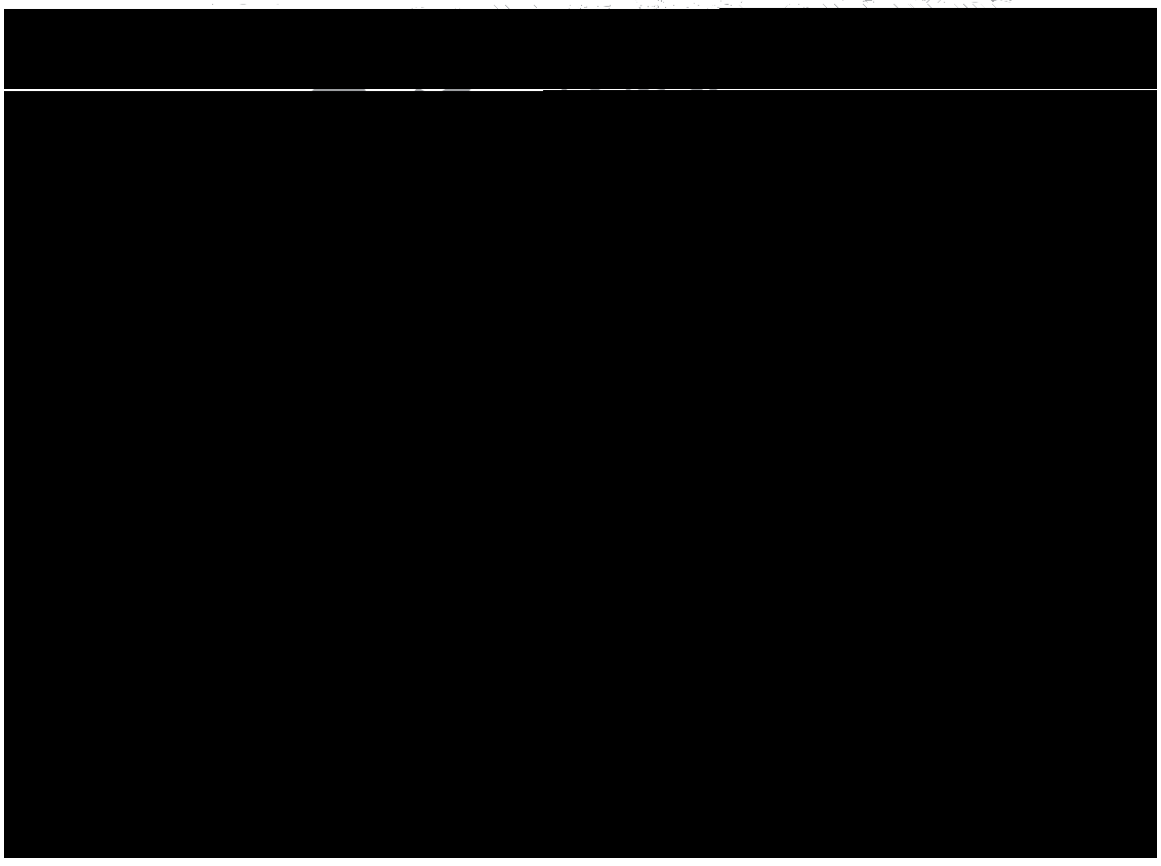
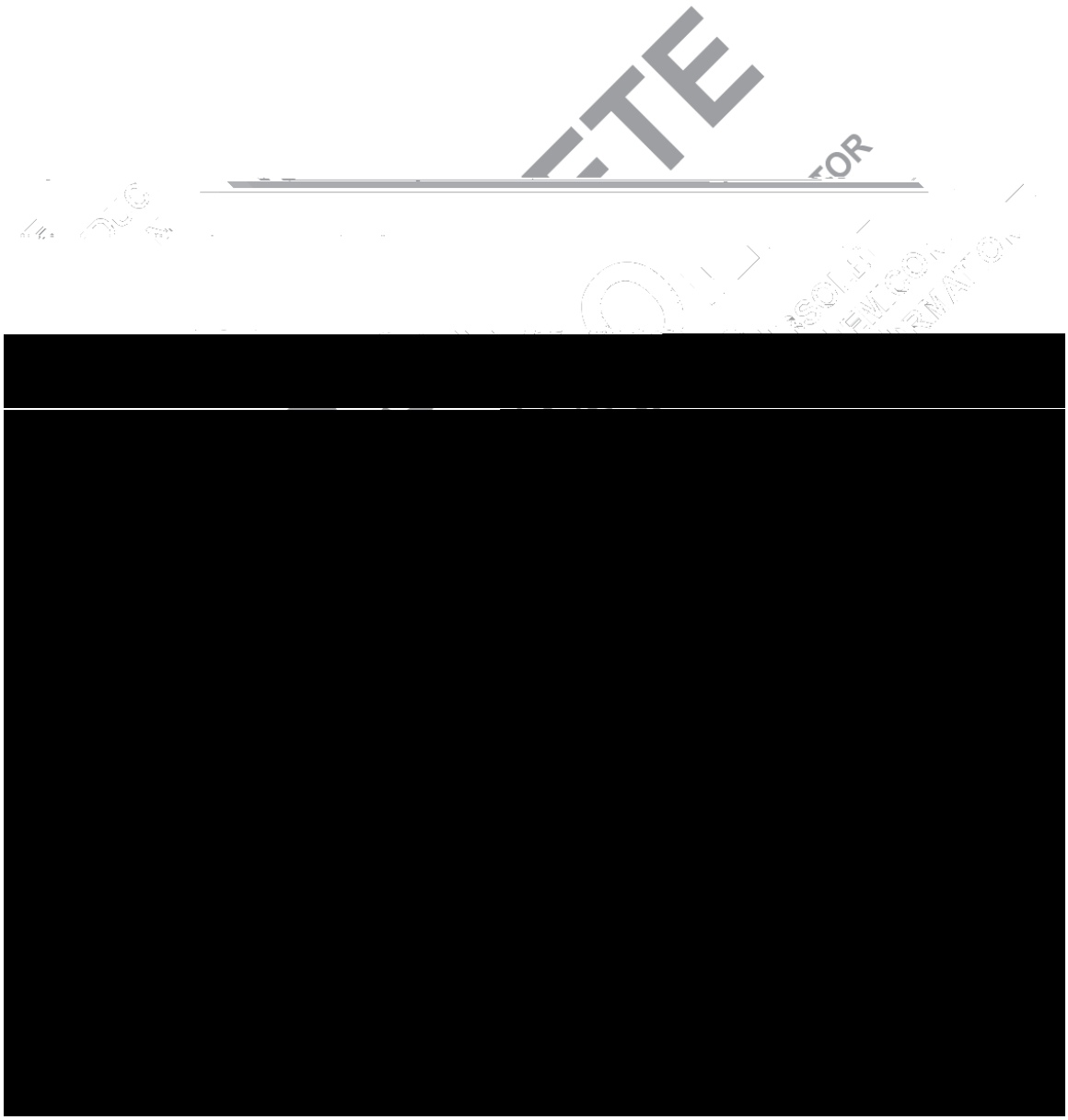
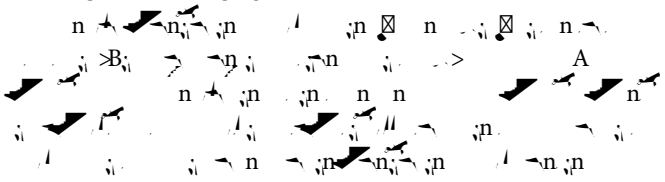
| Register | Description | Default |
|---|---|---|
| 0x0D | Remote temperature | 0x00 |
| 0x0E | Local temperature | 0x00 |
| 0x08 | Extended Resolution 1<br>Bits 1:0 remote temperature LSBs | 0x00 |
| 0x09 | Extended Resolution 2<br>Bits 1:0 local temperature LSBs | 0x00 |

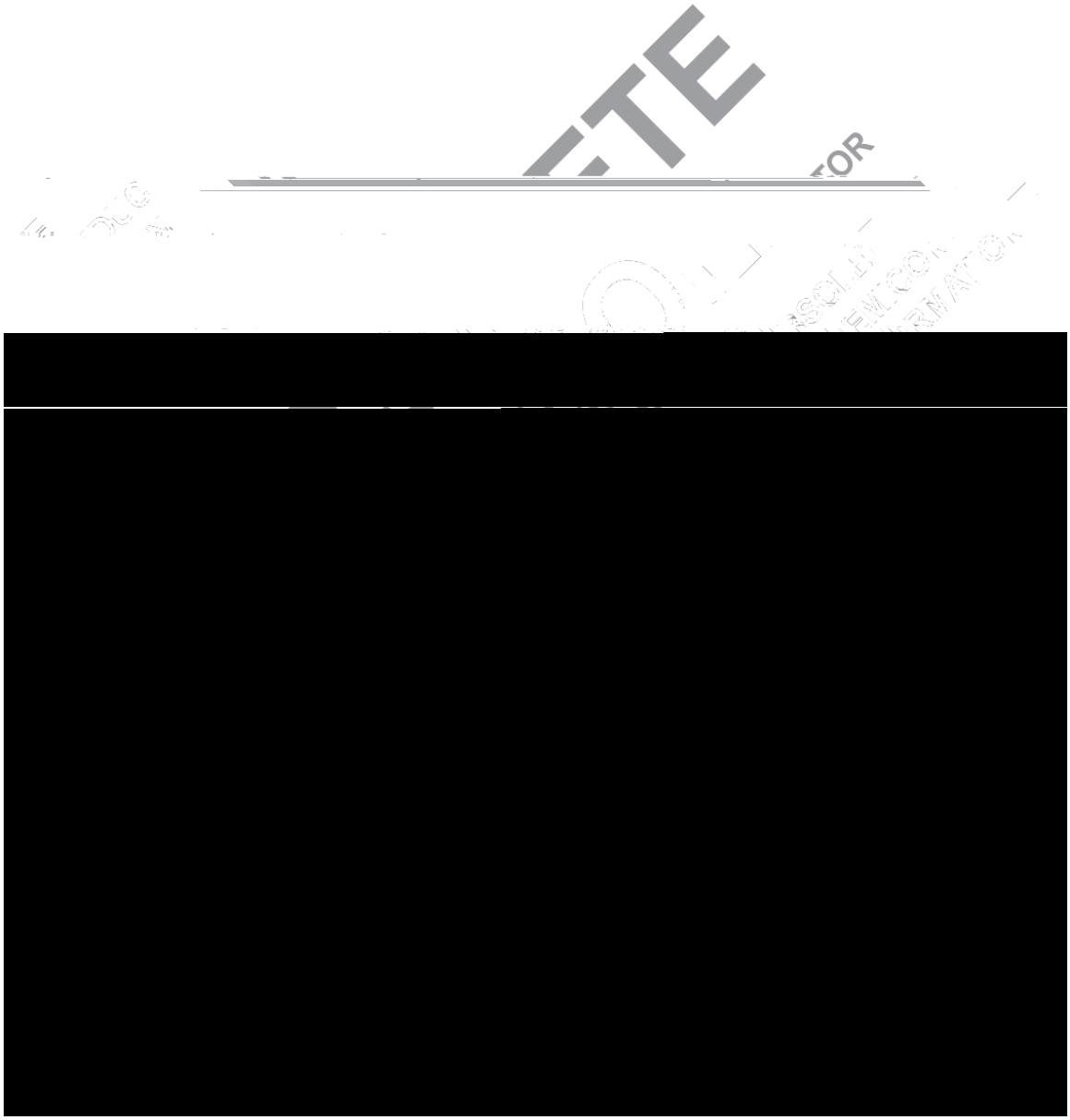
| Register | Description | Default |
|---|---|---|
| 0x1A | Remote1 temperature low limit | 0x00 |
| 0x1B | Remote1 temperature high limit | 0x7F |
| 0x1C | Local temperature low limit | 0x00 |

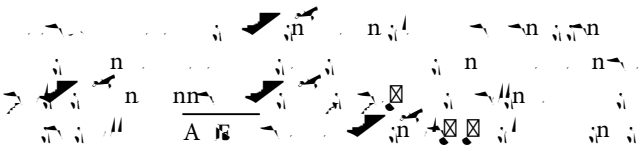


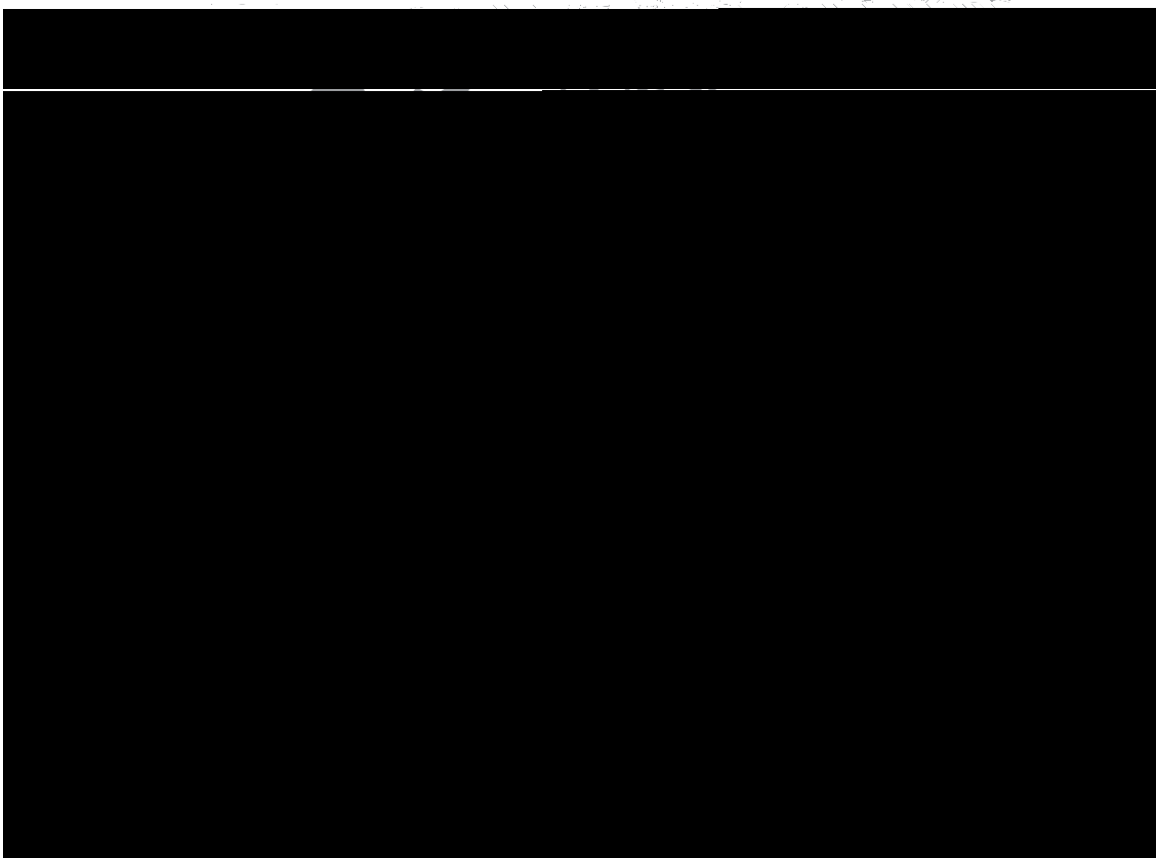


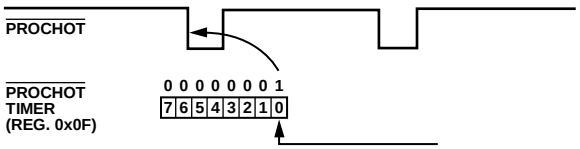
### Analog Monitoring Cycle Time









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## FAN DRIVE

A n n A n n

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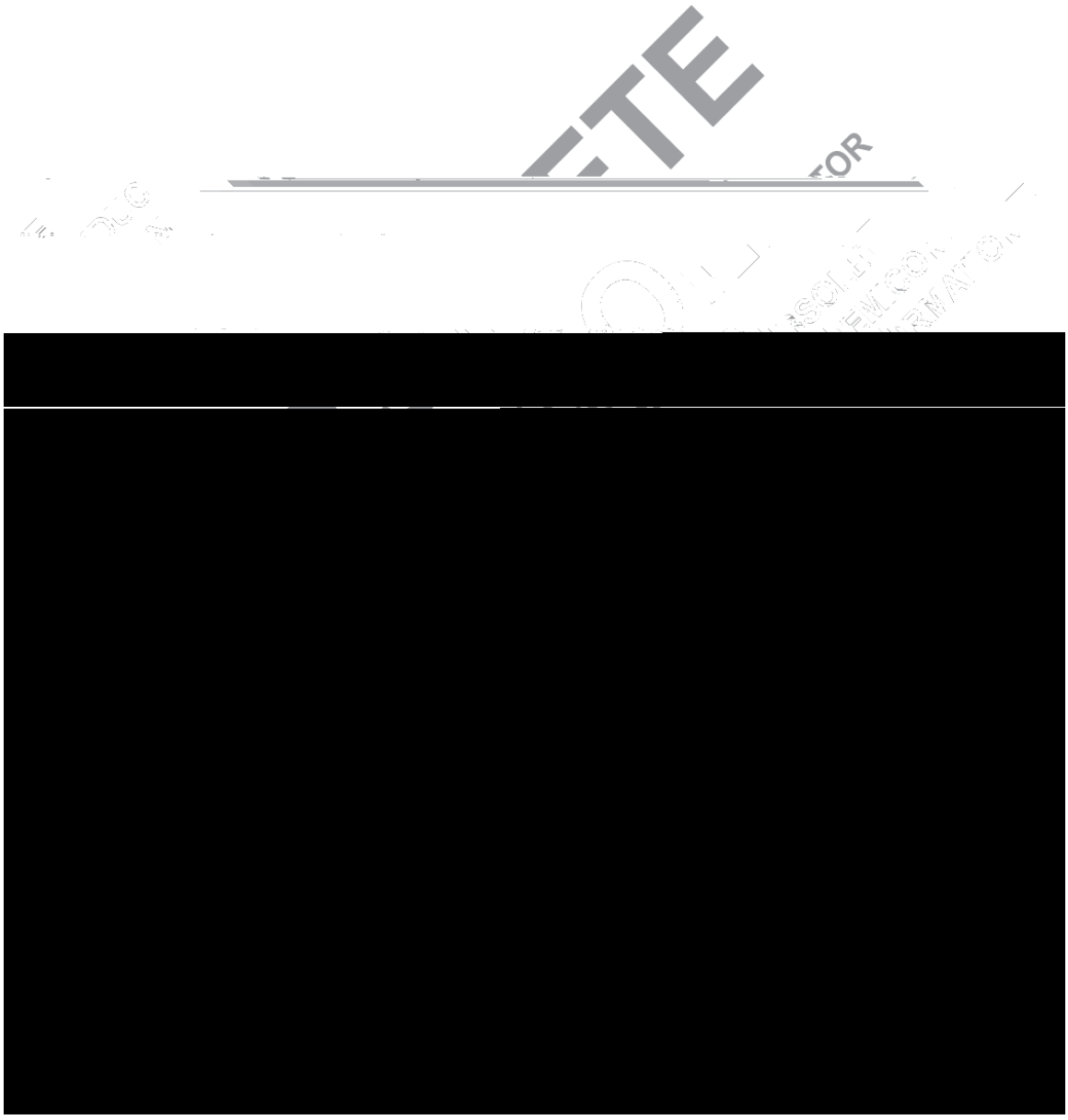
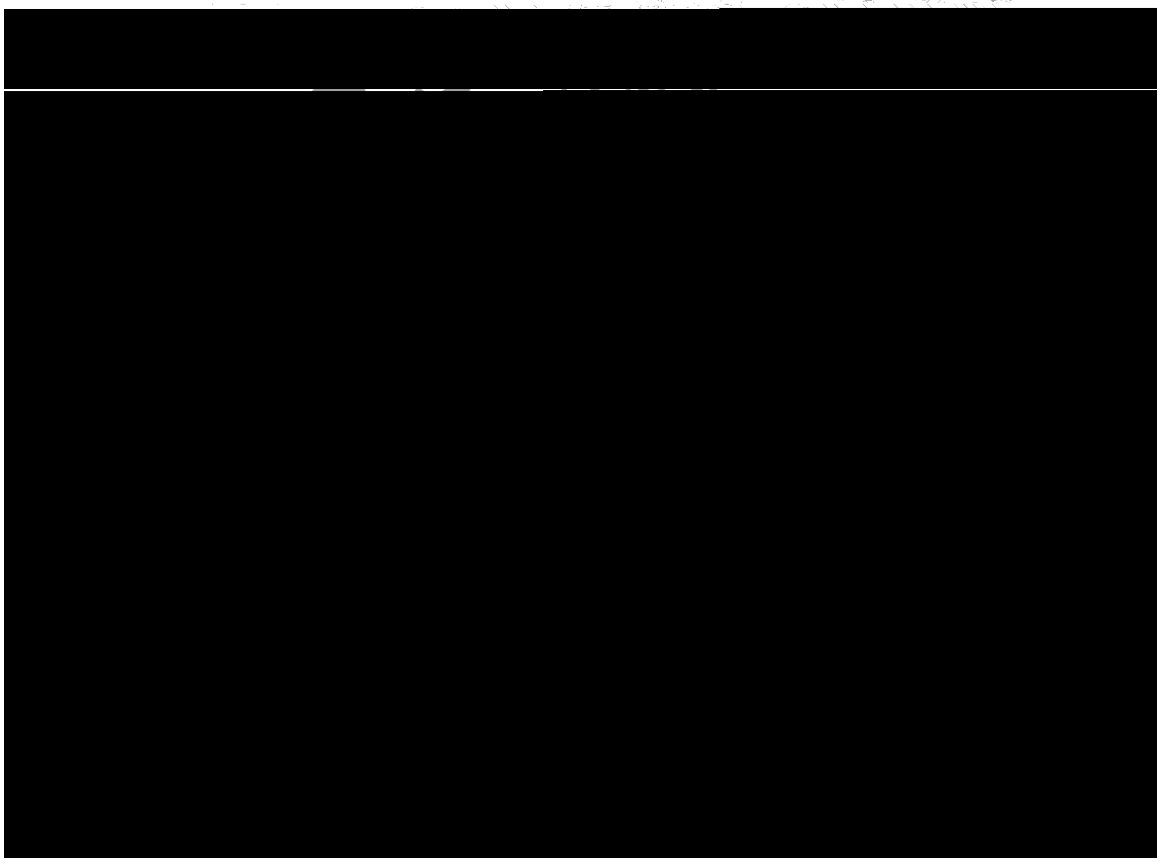


## AUTOMATIC FAN SPEED CONTROL

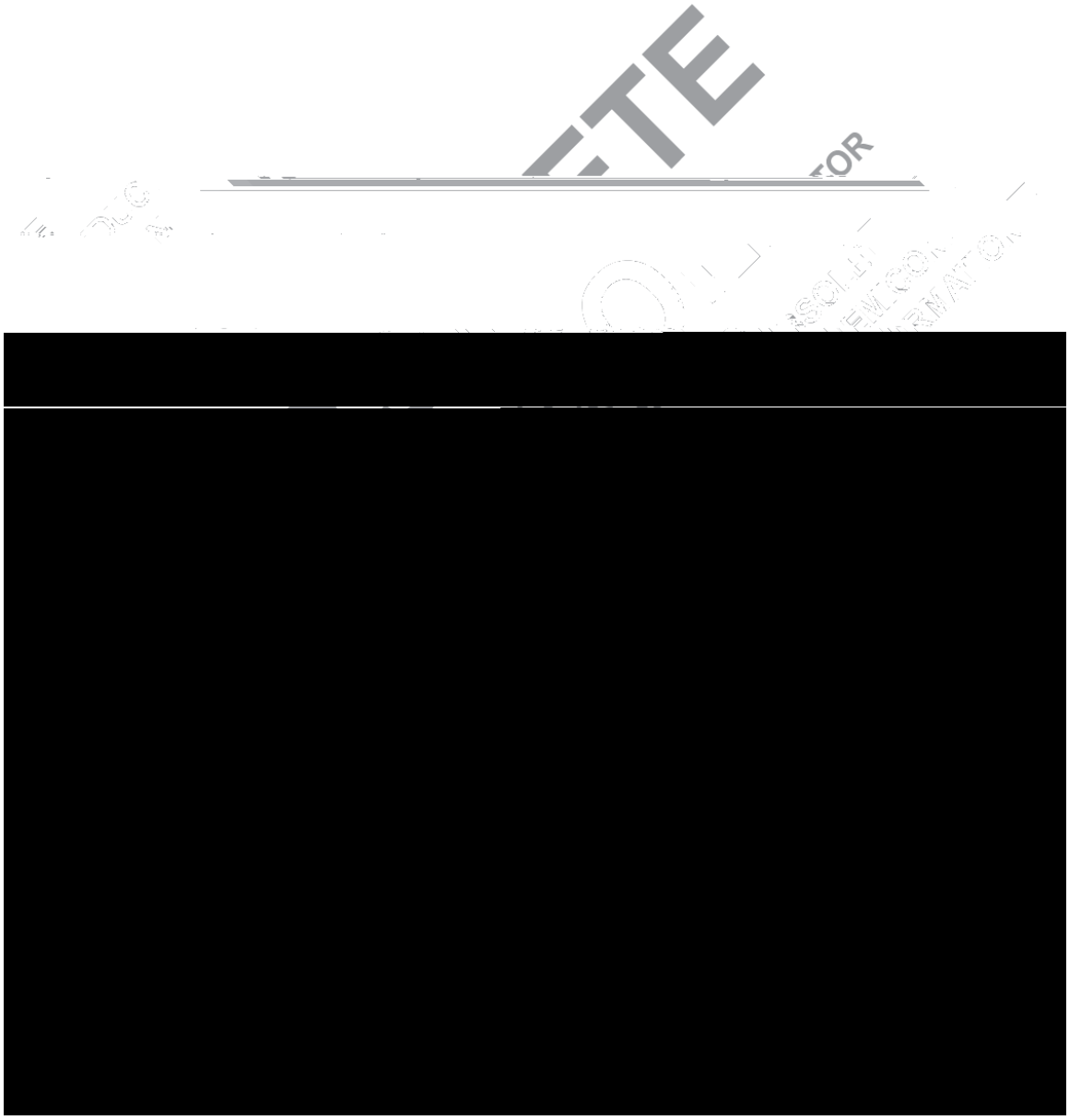
### Which Temperature Channel Controls Which Fan?



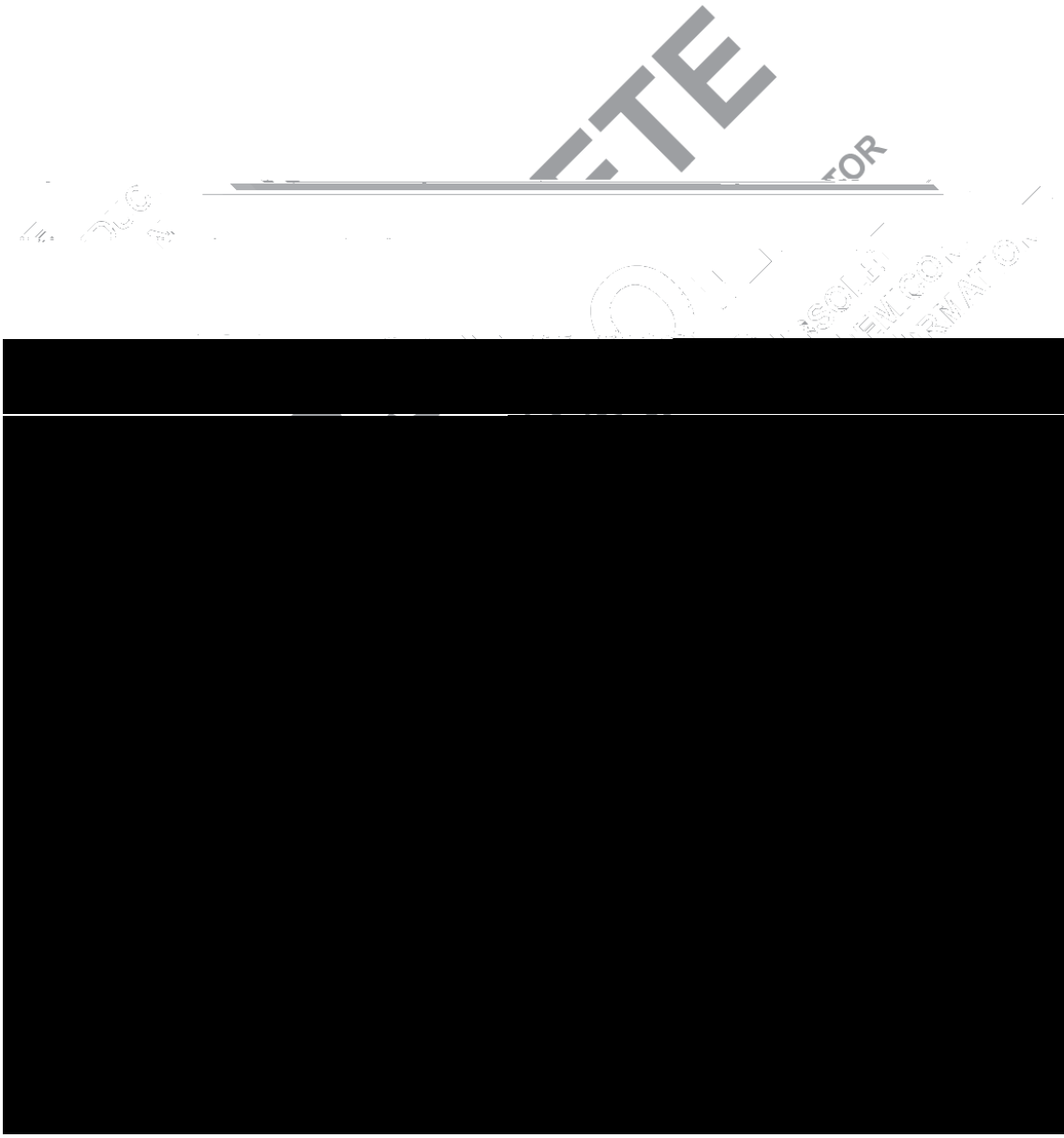
### AFC Loop Operation

AD

| Addr. | R/W | Name | Description | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | Default | Lock-able |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TRANGE | | | | | | | | | | |
| 0x2D | R/W | R1LTRANGE | REM1,LOC TRANGE | RM1R3 | RM1R2 | RM1R1 | RM1R0 | LOR3 | LOR2 | LOR1 | LOR0 | 0xCC | Yes |



AD



| Bit No. | Name | Read/Write | Description |
|---|---|---|---|
| 0 | TH1/REM2 | Read/Write | When this bit is set, Fan 2 speed is controlled by TH1 if Pin 11 is configured for thermistor, or by Thermal Diode 2 if Pin 11 is configured for thermal diode. |
| 1 | T H2 | Read/Write | When this bit is set, Fan 2 speed is controlled by TH2 if Pin 12 is configured for thermistor. |
| 2 | REM1 | Read/Write | When this bit is set, Fan 2 speed is controlled by Remote Temperature Input 1. |
| 3 | LOC | Read/Write | When this bit is set, Fan 2 speed is controlled by the local temperature input. |
| 4 | MAN | Read/Write | When this bit is set, Fan 2 speed is under user control by writing directly to the DRIVE2 register. This overrides all lower bit settings. |
| 5 | MIN | Read/Write | When this bit is set, Fan 2 runs at minimum speed. This overrides all lower bit settings. |
| 6 | STRT | Read/Write | When this bit is set, Fan 2 runs at startup speed. This overrides all lower bit settings. |
| 6 | MAX | Read/Write | When this bit is set, Fan 2 runs at maximum speed. This overrides all lower bit settings. |

| Bit No. | Name | Read/Write | Description |
|---|---|---|---|
| 0 | REM0 | Read only | LSB of remote temperature reading. |
| 1 | REM1 | Read only | Bit 1 of remote temperature reading. |
| 2 | VCC0 | Read only | LSB of $V_{CC}$ reading. |
| 3 | VCC1 | Read only | Bit 1 of $V_{CC}$ reading. |
| 4 | [redacted] | | |
| 5 | [redacted] | | |
| 6 | [redacted] | | |
| 7 | [redacted] | | |

| Bit No. | [redacted] |
|---|---|
| 0 | [redacted] |
| 1 | [redacted] |
| 2 | [redacted] |
| 3 | [redacted] |
| 4 | [redacted] |
| 5 | [redacted] |
| 6 | [redacted] |
| 7 | [redacted] |

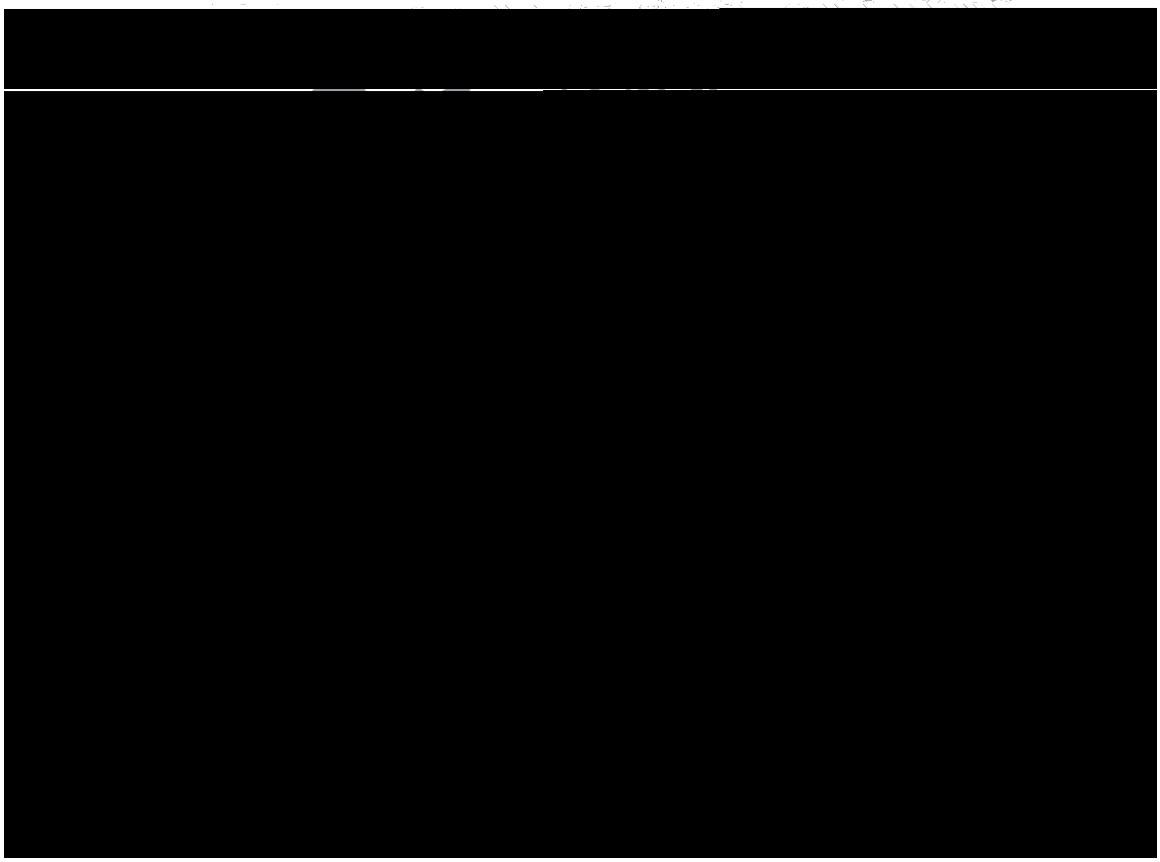
**Register Ad**[redacted]

AD

AD

| Register Address | Read/Write | Description | Power-On Default |
|---|---|---|---|
| 0x14 | Read/Write | AIN1(TH1)/REM2 low limit. | 0x00 |
| 0x15 | Read/Write | AIN1(TH1)/REM2 high limit. | 0xFF |
| 0x66 | Read/Write | AIN1(TH1)/REM2 low limit. | 0xT±MTpAG±µGfFwY-pAGG±±f w⊠X/oµADp±µ0 |

[redacted]



| Temperature | Binary | Offset Binary |
|---|---|---|
| -64°C | 0 000 0000 | 0 000 0000 |
| 0°C | 0 000 0000 | 0 100 0000 |
| 1°C | 0 000 0001 | 0 100 0001 |
| 10°C | 0 000 1010 | 0 100 1010 |
| 25°C | 0 001 1001 | 0 101 1001 |
| 50°C | 0 011 0010 | 0 111 0010 |
| 75°C | 0 100 1011 | 1 000 1011 |
| 100°C | 0 110 0100 | 1 010 0100 |
| 125°C | 0 111 1101 | 1 011 1101 |
| 127°C | 0 111 1111 | 1 011 1111 |
| 191°C | 0 111 1111 | 1 111 1111 |

| Bit No. | Name | Read/Write | Description |
|---|---|---|---|
| 3:0 | TH2R | Read/Write | These bits set the temperature range over which AFC operates for the TH2 input. The fan starts operating at $T_M$ and reaches full speed at $T_M$+ $T_R$ (where $T_M$ is the temperature set by the TMIN code, and $T_R$ is the temperature range set by the TRANGE code). |
| 7:4 | TH1R | Read/Write | These bits set the temperature range over which AFC operates for the TH1 or REM2 input. The fan starts operating at $T_M$ and reaches full speed at $T_M$+ $T_R$ (where $T_M$ is the temperature set by the TMIN code, and $T_R$ is the temperature range set by the TRANGE code). |

[redacted]

| Bit No. | N |
|---|---|
| 3:0 | L |
| 7:4 | R |

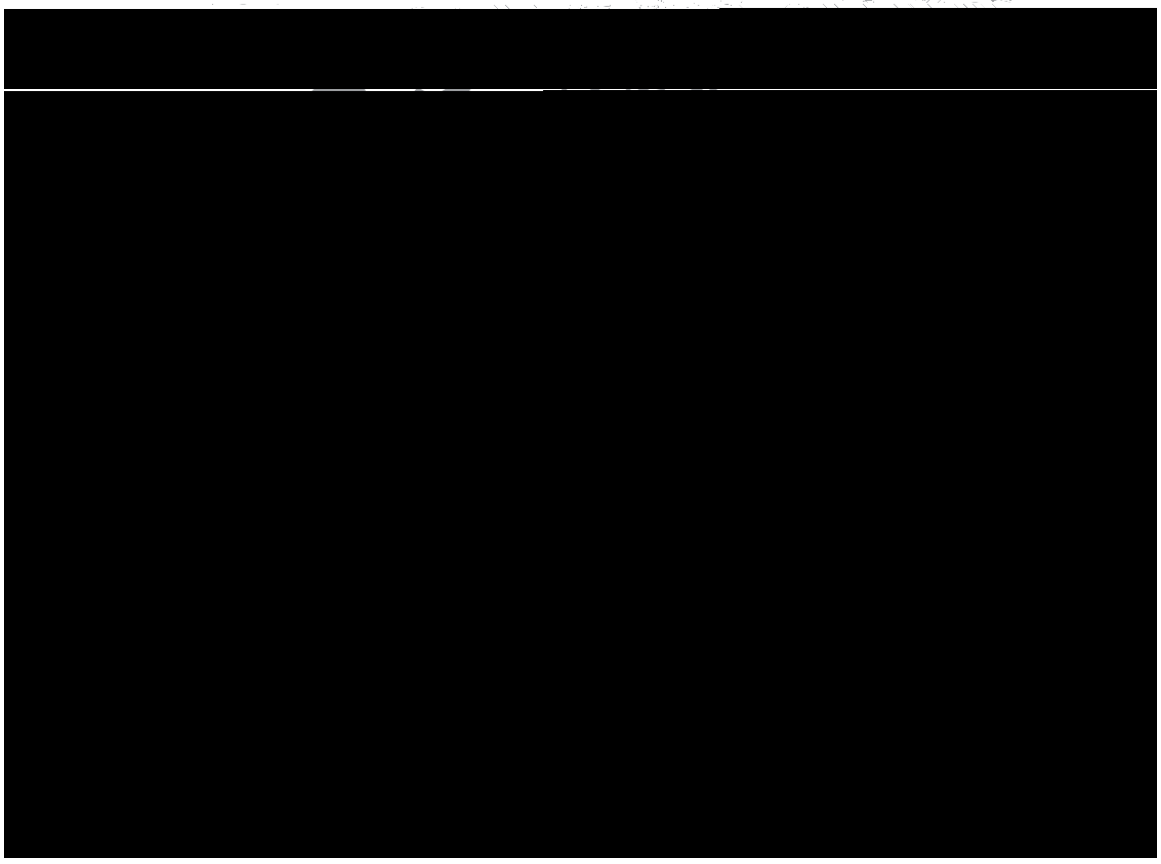
re input.
rature set
ere $T_M$ is
NGE code).

| Bits 7:4 or 3 | |
|---|---|
| 0000 | |
| 0001 | |
| 0010 | |
| 0011 | |
| 0100 | |
| 0101 | |
| 0110 | |
| 0111 | |
| 1000 | |
| 1001 | |
| 1010 | |
| 1011 | |
| 1100 | |
| 1101 | |
| 1110 | 53.33°C |
| 1111 | 80°C |

# AD

| Bit No. | Name | Read/Write | Description |
|---|---|---|---|
| 7:4 | TH1TH | Read/Write | This nibble contains the temperature hysteresis value for TH1/REM2. 0x0 = 0°C to 0xF = 15°C. |
| 3:0 | TH2TH | Read/Write | This nibble contains the temperature hysteresis value for TH2. 0x0 = 0°C to 0xF = 15°C. |

| Bit No. | Name | Read/Write | Description |
|---|---|---|---|
| 7:4 | RM1H | Read/Write | This nibble contains the temperature hysteresis value for remote temperature input. 0x0 = 0°C to 0xF = 15°C. |
| 3:0 | LOH | Read/Write | This nibble contains the temperature hysteresis value for local temperature input. 0x0 = 0°C to 0xF = 15°C. |

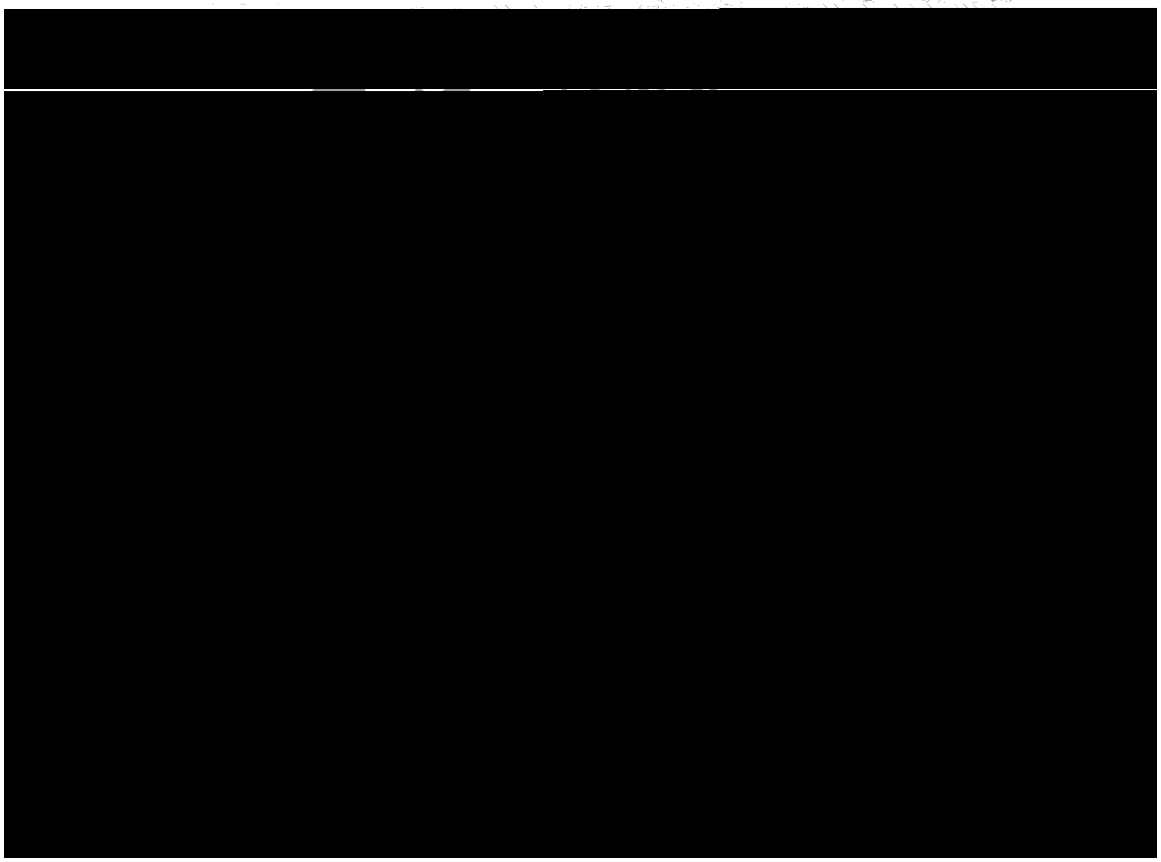


| Bit No. | Name | Read/Write | Description |
|---|---|---|---|
| 2:0 | FAN1 Step | Read/Write | These bits set the step size by which the DRIVE1 and DRIVE2 PWM output duty-cycle can change when enhance acoustics mode is selected.<br>000 = 1 bit<br>001 = 2 bits<br>010 = 3 bits<br>011 = 5 bits<br>100 = 8 bits<br>101 = 12 bits<br>110 = 24 bits<br>111 = 48 bits |
| 5:3 | FAN2 Step | Read/Write | |
| 6 | Enable Fan1 Enhanced Acoustics | Read/Write | When this bit is set to 1, enhanced acoustics are enabled for Fan 1. |
| 7 | Enable Fan2 Enhanced Acoustics | Read/Write | When this bit is set to 1, enhanced acoustics are enabled for Fan 2. |

| Bit No. | Name | Read/Write | Description |
|---|---|---|---|
| 2:0 | FAN1Fault | Read/Write | These bits set the step size by which the DRIVE1 and DRIVE2 PWM output duty-cycle can change in fan fault mode.<br>000 = 1 bit<br>001 = 2 bits |
| 5:3 | FAN2 Fault | Read/Write | |
| 7:6 | [redacted] | | |

| Bit No. | |
|---|---|
| 2:0 | |
| 5:3 | |
| 7:6 | |

| Bit No. | Name | Read/Write | Description |
|---|---|---|---|
| 1:0 | FAN1 | Read/Write | Sets number of pulses to be counted when measuring FAN1 speed. Can be used to determine fan's pulses per revolution number for unknown fan type.<br>**Pulses Counted**<br>00 = 1<br>01 = 2 (default)<br>10 = 3<br>11 = 4 |
| 3:2 | FAN2 | Read/Write | Sets number of pulses to be counted when measuring FAN2 speed. Can be used to determine fan's pulses per revolution number for unknown fan type.<br>**Pulses Counted**<br>00 = 1<br>01 = 2 (default)<br>10 = 3<br>11 = 4 |
| 7:4 | Unused | – | Unused. Write ignored. Reads back 0. |



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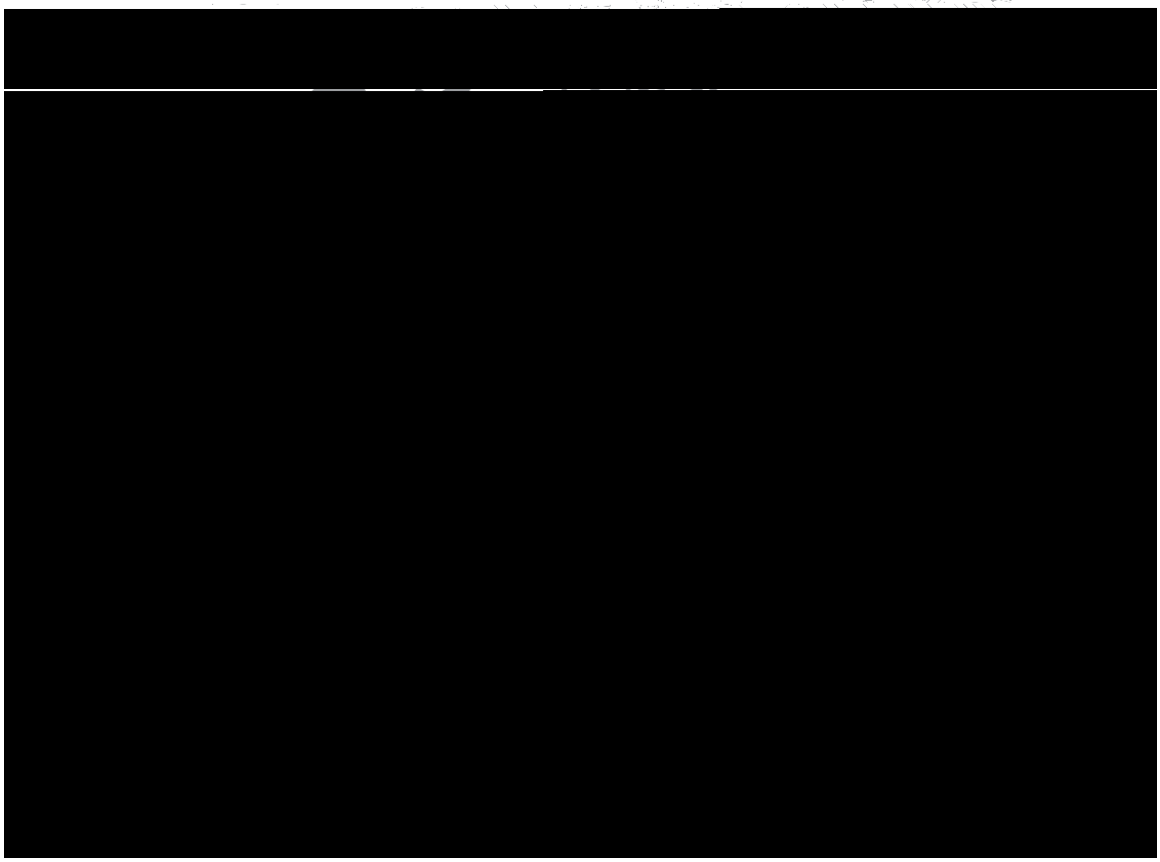
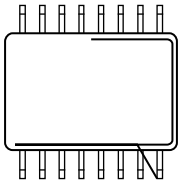
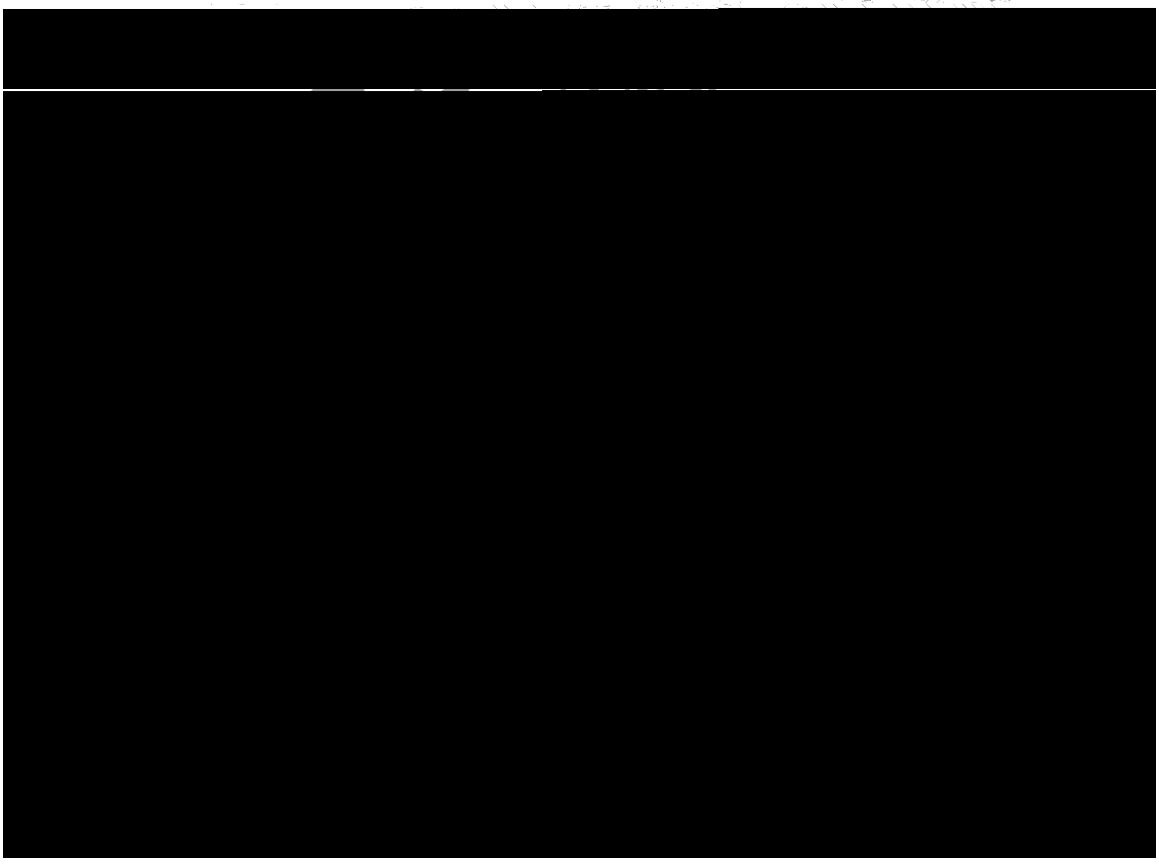


## [illegible]



[illegible]