

6B259

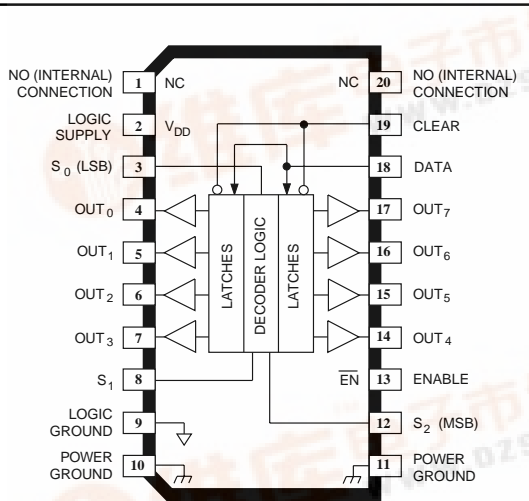
Data Sheet
26186.122

ADVANCE INFORMATION

(Subject to change without notice)

January 24, 2000

8-BIT ADDRESSABLE DMOS POWER DRIVER



Dwg. PP-050-1

Note that the A6B259KA (DIP) and the A6B259KLW (SOIC) are electrically identical and share a common terminal number assignment.

The A6B259KA and A6B259KLW combine a 3-to-8 line CMOS decoder and accompanying data latches, control circuitry, and DMOS outputs in a multi-functional power driver capable of storing single-line data in the addressable latches or use as a decoder or demultiplexer. Driver applications include relays, solenoids, and other medium-current or high-voltage peripheral power loads.

The CMOS inputs and latches allow direct interfacing with micro-processor-based systems. Use with TTL may require appropriate pull-up resistors to ensure an input logic high. Four modes of operation are selectable with the CLEAR and ENABLE inputs.

The A6B259KA/KLW DMOS open-drain outputs are capable of sinking up to 500 mA. Similar devices with reduced $r_{DS(on)}$ are available as the A6259KA/KLW.

The A6B259KA is furnished in a 20-pin dual in-line plastic package. The A6B259KLW is furnished in a 20-lead wide-body, small-outline plastic package (SOIC) with gull-wing leads for surface-mount applications. Copper lead frames, reduced supply current requirements, and low on-state resistance allow either device to sink 150 mA from all outputs continuously, to ambient temperatures greater than 85°C.

ABSOLUTE MAXIMUM RATINGS at $T_A = 25^\circ\text{C}$

| | |
|--------------------------------------|-------------------------|
| Output Voltage, V_O | 50 V |
| Output Drain Current, | |
| Continuous, I_O | 150 mA* |
| Peak, I_{OM} | 500 mA† |
| Single-Pulse Avalanche Energy, | |
| E_{AS} | 30 mJ |
| Logic Supply Voltage, V_{DD} | 7.0 V |
| Input Voltage Range, | |
| V_I | -0.3 V to +7.0 V |
| Package Power Dissipation, | |
| P_D | See Graph |
| Operating Temperature Range, | |
| T_A | -40°C to +125°C |
| Storage Temperature Range, | |
| T_S | -55°C to +150°C |

* Each output, all outputs on.

† Pulse duration $\leq 100 \mu\text{s}$, duty cycle $\leq 2\%$.

Caution: These CMOS devices have input static protection (Class 3) but are still susceptible to damage if exposed to extremely high static electrical charges.

FEATURES

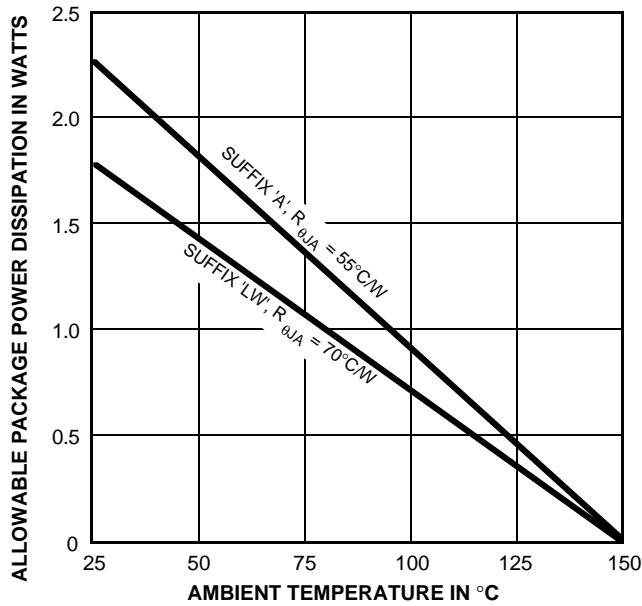
- 50 V Minimum Output Clamp Voltage
- 150 mA Output Current (all outputs simultaneously)
- 5 Ω Typical $r_{DS(on)}$
- Low Power Consumption
- Replacements for TPIC6B259N and TPIC6B259DW

Always order by complete part number:

| Part Number | Package | $R_{\theta JA}$ | $R_{\theta JC}$ |
|-------------|--------------|-----------------|-----------------|
| A6B259KA | 20-pin DIP | 55°C/W | 25°C/W |
| A6B259KLW | 20-lead SOIC | 70°C/W | 17°C/W |

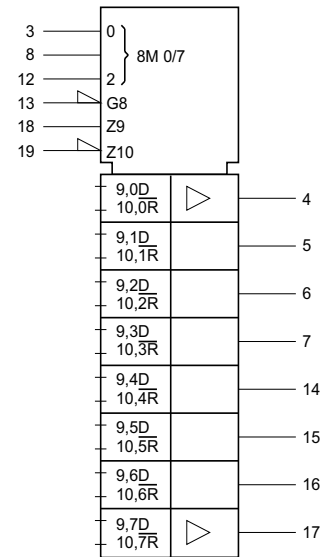


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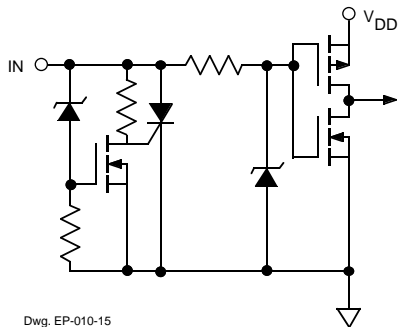


Dwg. GS-004A

LOGIC SYMBOL

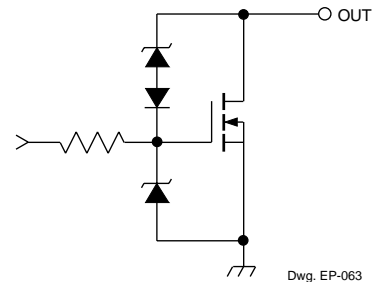


Dwg. FP-046



Dwg. EP-010-15

LOGIC INPUTS



Dwg. EP-063

DMOS POWER DRIVER OUTPUT

FUNCTION TABLE

| CLEAR | Inputs | | Addressed OUTPUT | Other OUTPUTs | Function |
|-------|--------|------|------------------|---------------|----------------------|
| | ENABLE | DATA | | | |
| H | L | H | L | R | Addressable Latch |
| H | L | L | H | R | Addressable Latch |
| H | H | X | R | R | Memory |
| L | L | H | L | H | 8-Line Demultiplexer |
| L | L | L | H | H | 8-Line Demultiplexer |
| L | H | X | H | H | Clear |

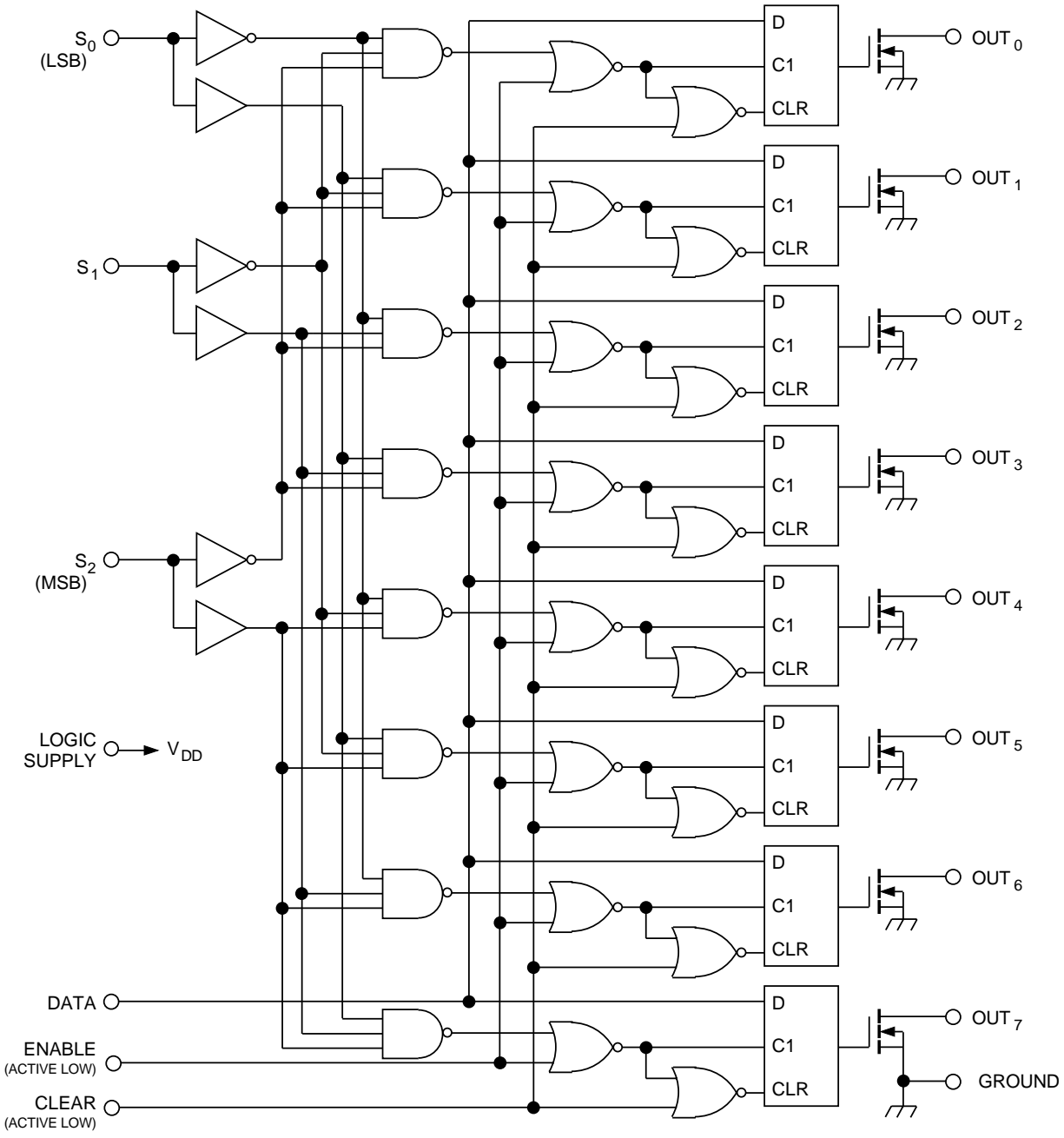
L = Low Logic Level H = High Logic Level X = Irrelevant R = Previous State

LATCH SELECTION TABLE

| Select Inputs | | | Addressed OUTPUT |
|---------------|-------|-------------|------------------|
| S_2 (MSB) | S_1 | S_0 (LSB) | |
| L | L | L | 0 |
| L | L | H | 1 |
| L | H | L | 2 |
| L | H | H | 3 |
| H | L | L | 4 |
| H | L | H | 5 |
| H | H | L | 6 |
| H | H | H | 7 |

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FUNCTIONAL BLOCK DIAGRAM



Dwg. FP-047

Grounds (terminals 9, 10, and 11) must be connected externally to a single point.

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RECOMMENDED OPERATING CONDITIONS

over operating temperature range

Logic Supply Voltage Range, V_{DD} 4.5 V to 5.5 V

High-Level Input Voltage, V_{IH} $\geq 0.85V_{DD}$

Low-level input voltage, V_{IL} $\leq 0.15V_{DD}$

ELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$, $V_{DD} = 5\text{ V}$, $t_{ir} = t_{if} \leq 10\text{ ns}$ (unless otherwise specified).

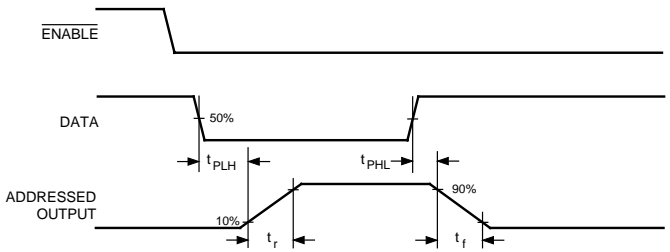
| Characteristic | Symbol | Test Conditions | Limits | | | Units |
|---|---------------|---|--------|------|------|---------------|
| | | | Min. | Typ. | Max. | |
| Logic Supply Voltage | V_{DD} | Operating | 4.5 | 5.0 | 5.5 | V |
| Output Breakdown Voltage | $V_{(BR)DSX}$ | $I_O = 1\text{ mA}$ | 50 | — | — | V |
| Off-State Output Current | I_{DSX} | $V_O = 40\text{ V}$, $V_{DD} = 5.5\text{ V}$ | — | 0.1 | 5.0 | μA |
| | | $V_O = 40\text{ V}$, $V_{DD} = 5.5\text{ V}$, $T_A = 125^\circ\text{C}$ | — | 0.15 | 8.0 | μA |
| Static Drain-Source On-State Resistance | $r_{DS(on)}$ | $I_O = 100\text{ mA}$, $V_{DD} = 4.5\text{ V}$ | — | 4.2 | 5.7 | Ω |
| | | $I_O = 100\text{ mA}$, $V_{DD} = 4.5\text{ V}$, $T_A = 125^\circ\text{C}$ | — | 6.8 | 9.5 | Ω |
| | | $I_O = 350\text{ mA}$, $V_{DD} = 4.5\text{ V}$ (see note) | — | 5.5 | 8.0 | Ω |
| Nominal Output Current | I_{ON} | $V_{DS(on)} = 0.5\text{ V}$, $T_A = 85^\circ\text{C}$ | — | 90 | — | mA |
| Logic Input Current | I_{IH} | $V_I = V_{DD} = 5.5\text{ V}$ | — | — | 1.0 | μA |
| | I_{IL} | $V_I = 0$, $V_{DD} = 5.5\text{ V}$ | — | — | -1.0 | μA |
| Prop. Delay Time | t_{PLH} | $I_O = 100\text{ mA}$, $C_L = 30\text{ pF}$ | — | 150 | — | ns |
| | t_{PHL} | $I_O = 100\text{ mA}$, $C_L = 30\text{ pF}$ | — | 90 | — | ns |
| Output Rise Time | t_r | $I_O = 100\text{ mA}$, $C_L = 30\text{ pF}$ | — | 200 | — | ns |
| Output Fall Time | t_f | $I_O = 100\text{ mA}$, $C_L = 30\text{ pF}$ | — | 200 | — | ns |
| Supply Current | $I_{DD(OFF)}$ | $V_{DD} = 5.5\text{ V}$, Outputs off | — | 20 | 100 | μA |
| | $I_{DD(ON)}$ | $V_{DD} = 5.5\text{ V}$, Outputs on | — | 150 | 300 | μA |

Typical Data is at $V_{DD} = 5\text{ V}$ and is for design information only.

NOTE — Pulse test, duration $\leq 100\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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FUNCTIONAL DESCRIPTION and INPUT REQUIREMENTS



Dwg. WP-036

OUTPUT SWITCHING TIME

Four modes of operation are selectable by controlling the CLEAR and ENABLE inputs as shown above.

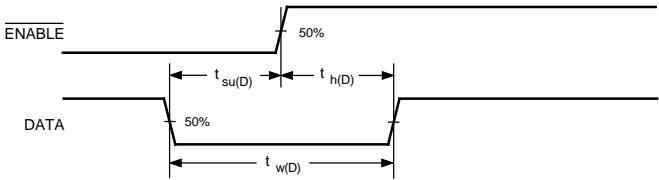
In the addressable-latch mode, data at the DATA input is written into the addressed transparent latch. The addressed output inverts the data input with all other outputs remaining in their previous states.

In the memory mode, all outputs remain in their previous states and are unaffected by the DATA or address (S_n) inputs. To prevent entering erroneous data in the latches, ENABLE should be held HIGH while the address lines are changing.

In the demultiplexing/decoding mode, the addressed output inverts the data input and all other outputs are OFF.

In the clear mode, all outputs are OFF and are unaffected by the DATA or address (S_N) inputs.

Given the appropriate inputs, when DATA is LOW for a given address, the output is OFF; when DATA is HIGH, the output is ON and can sink current.



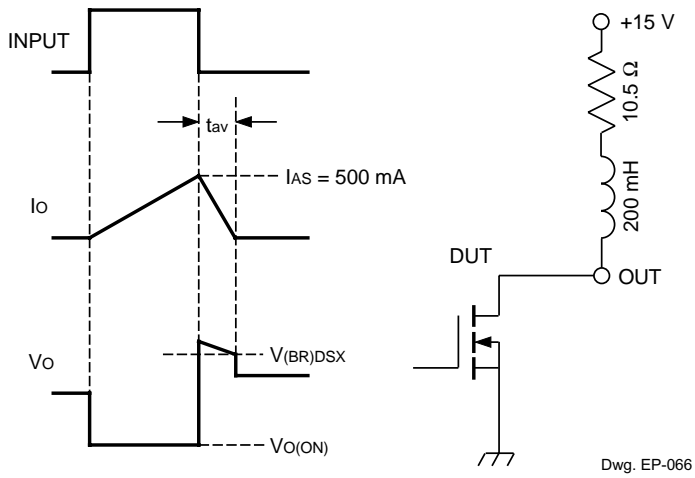
Dwg. WP-037

DATA INPUT REQUIREMENTS

| | |
|---|-------------------|
| Data Active Time Before Enable (Data Set-Up Time), $t_{su(D)}$ | 20 ns |
| Data Active Time After Enable (Data Hold Time), $t_{h(D)}$ | 20 ns |
| Data Pulse Width, $t_{w(D)}$ | 40 ns |
| Input Logic High, V_{IH} | $\geq 0.85V_{CC}$ |
| Input Logic Low, V_{IL} | $\leq 0.15V_{CC}$ |

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TEST CIRCUITS

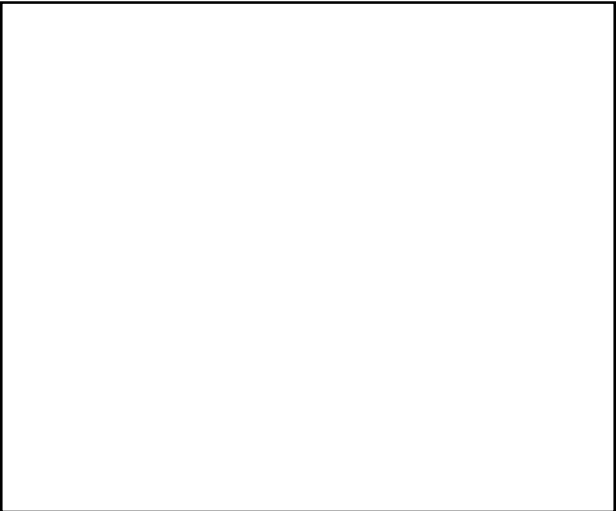
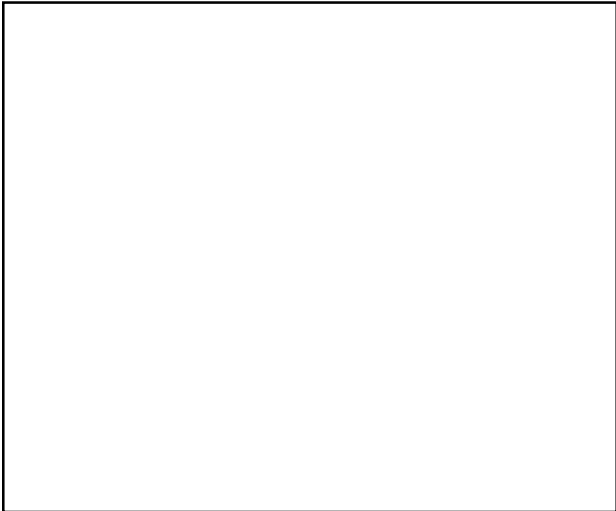
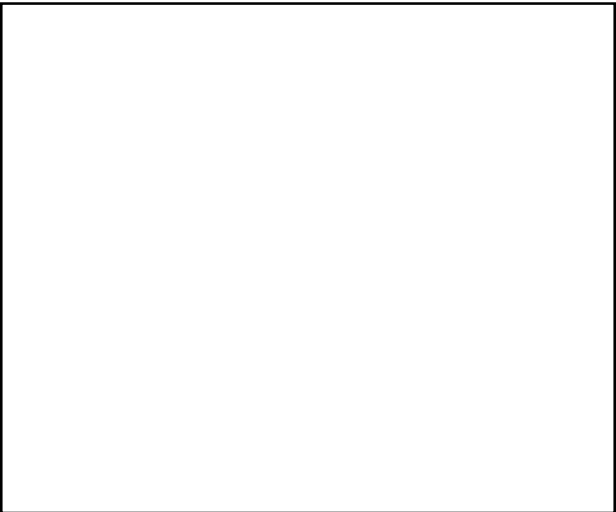
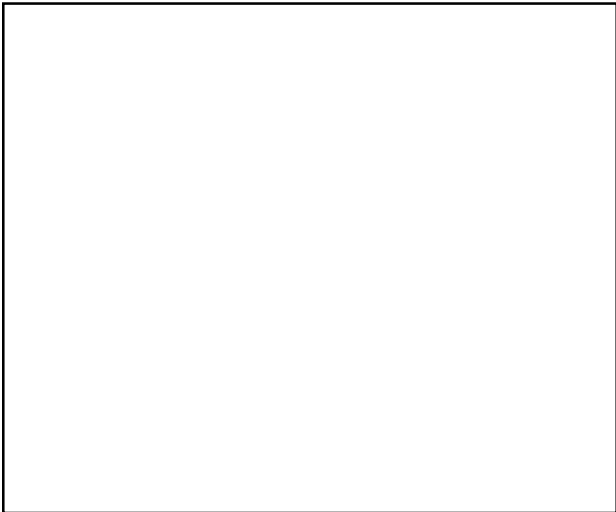


$$E_{AS} = I_{AS} \times V_{(BR)DSX} \times t_{AV}/2$$

Single-Pulse Avalanche Energy Test Circuit and Waveforms

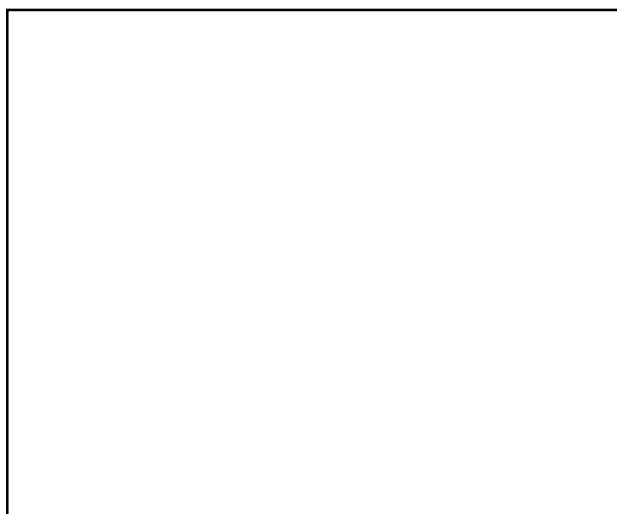
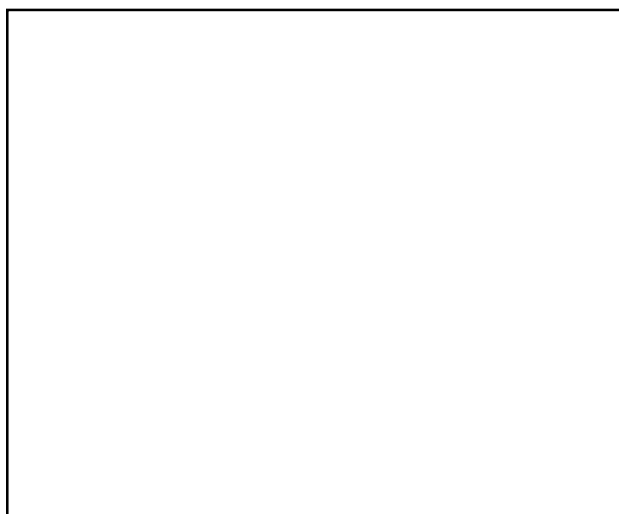
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TYPICAL CHARACTERISTICS



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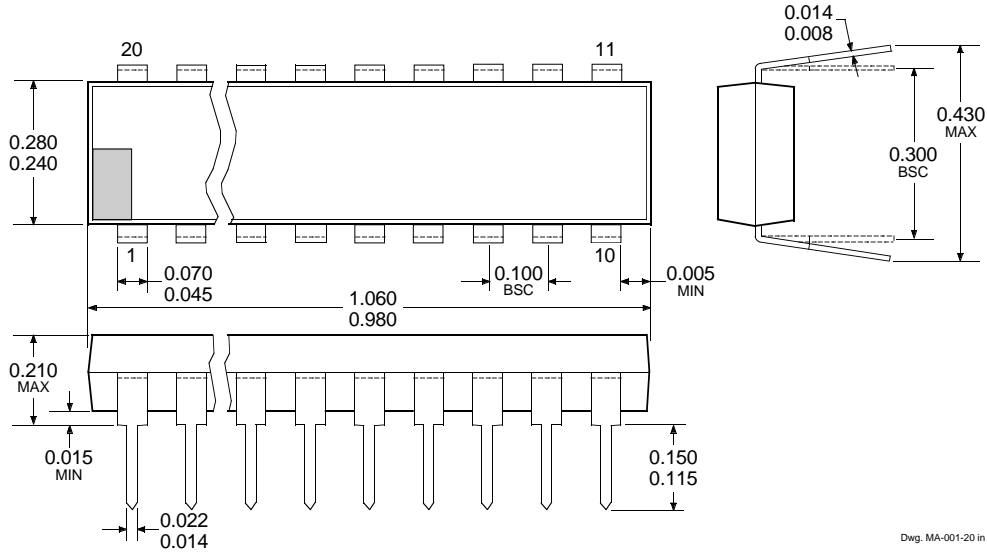
TERMINAL DESCRIPTIONS

| Terminal No. | Terminal Name | Function |
|---------------------|----------------------|---|
| 1 | NC | No (internal) connection. |
| 2 | LOGIC SUPPLY | (V_{DD}) The logic supply voltage (typically 5 V). |
| 3 | S_0 | Binary-coded output-select input, least-significant bit. |
| 4 | OUT_0 | Current-sinking, open-drain DMOS output, address 000. |
| 5 | OUT_1 | Current-sinking, open-drain DMOS output, address 001. |
| 6 | OUT_2 | Current-sinking, open-drain DMOS output, address 010. |
| 7 | OUT_3 | Current-sinking, open-drain DMOS output, address 011. |
| 8 | S_1 | Binary-coded output-select input. |
| 9 | LOGIC GROUND | Reference terminal for logic voltage measurements. |
| 10 | POWER GROUND | Reference terminal for output voltage measurements (OUT_{0-3}). |
| 11 | POWER GROUND | Reference terminal for output voltage measurements (OUT_{4-7}). |
| 12 | S_2 | Binary-coded output-select input, most-significant bit. |
| 13 | ENABLE | Mode control input; see Function Table. |
| 14 | OUT_4 | Current-sinking, open-drain DMOS output, address 100. |
| 15 | OUT_5 | Current-sinking, open-drain DMOS output, address 101. |
| 16 | OUT_6 | Current-sinking, open-drain DMOS output, address 110. |
| 17 | OUT_7 | Current-sinking, open-drain DMOS output, address 111. |
| 18 | DATA | CMOS data input to the addressed output latch. When enabled, the addressed output inverts the data input (DATA = HIGH, OUTPUT = LOW). |
| 19 | CLEAR | Mode control input; see Function Table. |
| 20 | NC | No (internal) connection. |

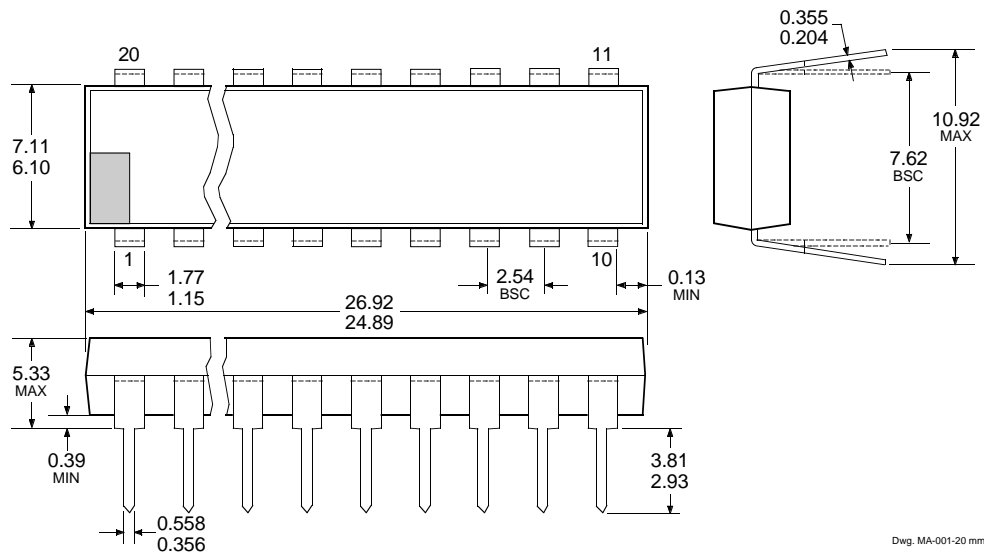
NOTE — Grounds (terminals 9, 10, and 11) must be connected externally to a single point.

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A6B259KA Dimensions in Inches (controlling dimensions)



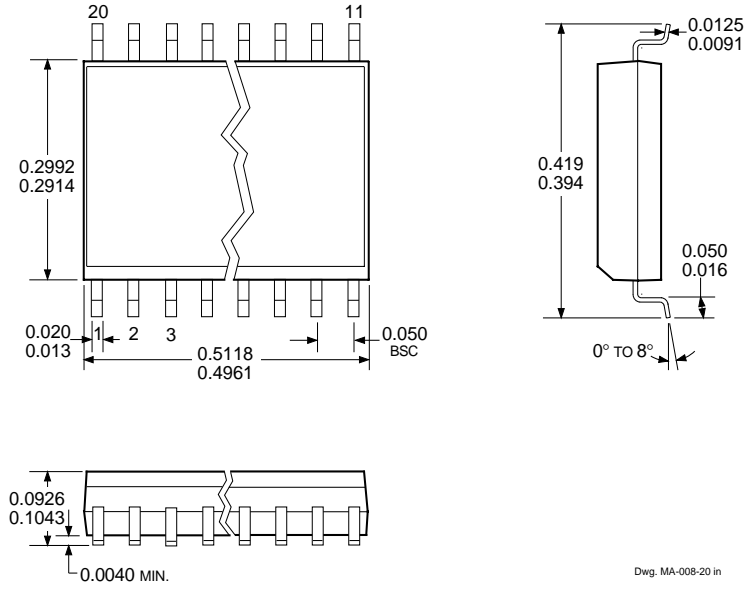
Dimensions in Millimeters (for reference only)



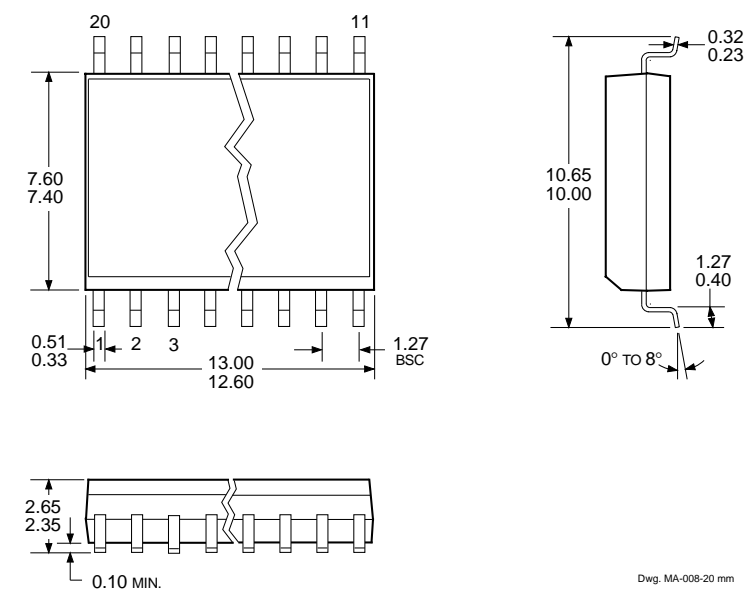
- NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
 2. Lead spacing tolerance is non-cumulative.
 3. Lead thickness is measured at seating plane or below.

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A6B259KLW
 Dimensions in Inches
 (for reference only)



Dimensions in Millimeters
 (controlling dimensions)



NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
 2. Lead spacing tolerance is non-cumulative.

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