

6A259

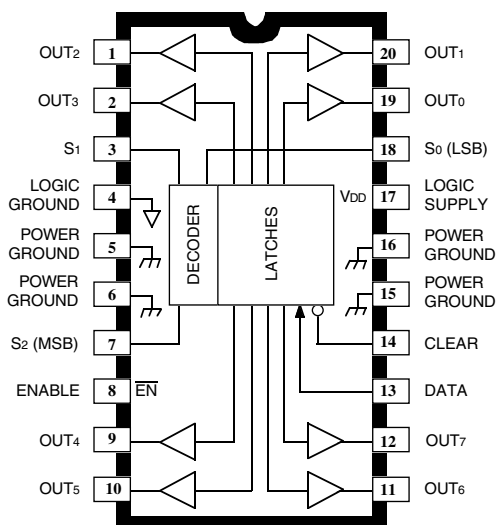
ADVANCE INFORMATION

(Subject to change without notice)

March 22, 2000

8-BIT ADDRESSABLE DMOS POWER DRIVER

A6A259KA (DIP)



Dwg. PP-050-4

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

Output Voltage, V_O	50 V
Output Drain Current,	
Continuous, I_O	350 mA*
Peak, I_{OM}	1100 mA*†
Peak, I_{OM}	2.0 A†
Single-Pulse Avalanche Energy,	
E_{AS}	75 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.

The A6A259KA and A6A259KLB 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 addressed DMOS output inverts the DATA input with all unaddressed outputs remaining in their previous states. All of the output drivers are disabled (the DMOS sink drivers turned off) with the CLEAR input low and the ENABLE input high. The A6A259KA/KLB DMOS open-drain outputs are capable of sinking up to 500 mA.

The A6A259KA is furnished in a 20-pin dual in-line plastic package. The A6A259KLB is furnished in a 24-lead wide-body, small-outline plastic batwing package (SOIC) with gull-wing leads for surface-mount applications. Copper lead frames, reduced supply current requirements, and low on-state resistance allow both devices to sink 150 mA from all outputs continuously, to ambient temperatures over 85°C.

FEATURES

- 50 V Minimum Output Clamp Voltage
- 350 mA Output Current (all outputs simultaneously)
- 1 Ω Typical $r_{DS(on)}$
- Internal Short-Circuit Protection
- Low Power Consumption
- Replacements for TPIC6A259N and TPIC6A259DW

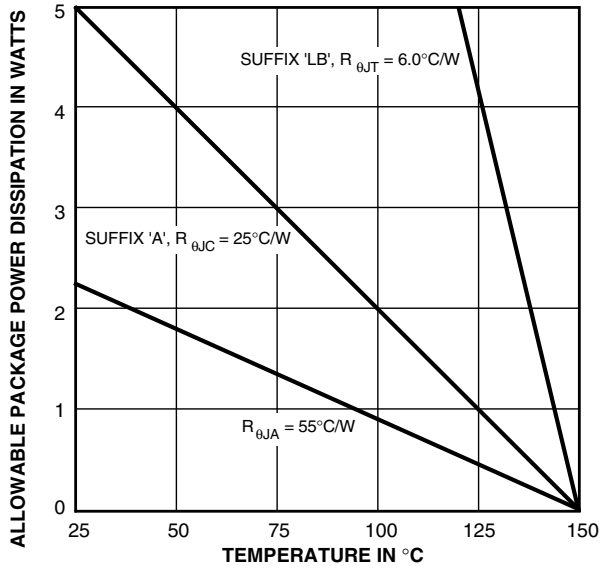
Always order by complete part number:

Part Number	Package	$R_{\theta JA}$	$R_{\theta JC}$	$R_{\theta JT}$
A6A259KA	20-pin DIP	55°C/W	25°C/W	—
A6A259KLB	24-lead SOIC	55°C/W	—	6°C/W

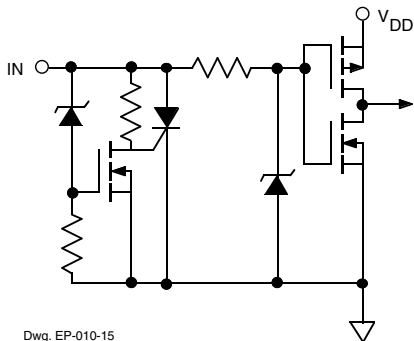
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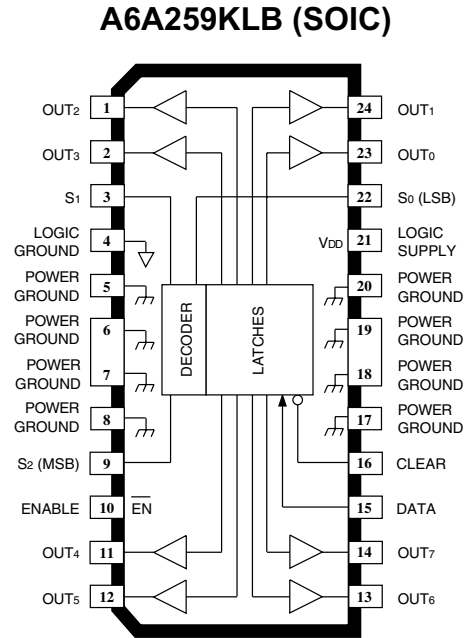


Dwg. GP-049-5

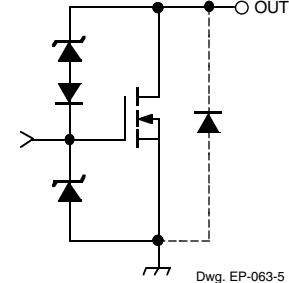


Dwg. EP-010-15

LOGIC INPUTS



Dwg. PP-050-3A



Dwg. EP-063-5

DMOS POWER DRIVER OUTPUT

FUNCTION TABLE

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

LATCH SELECTION TABLE

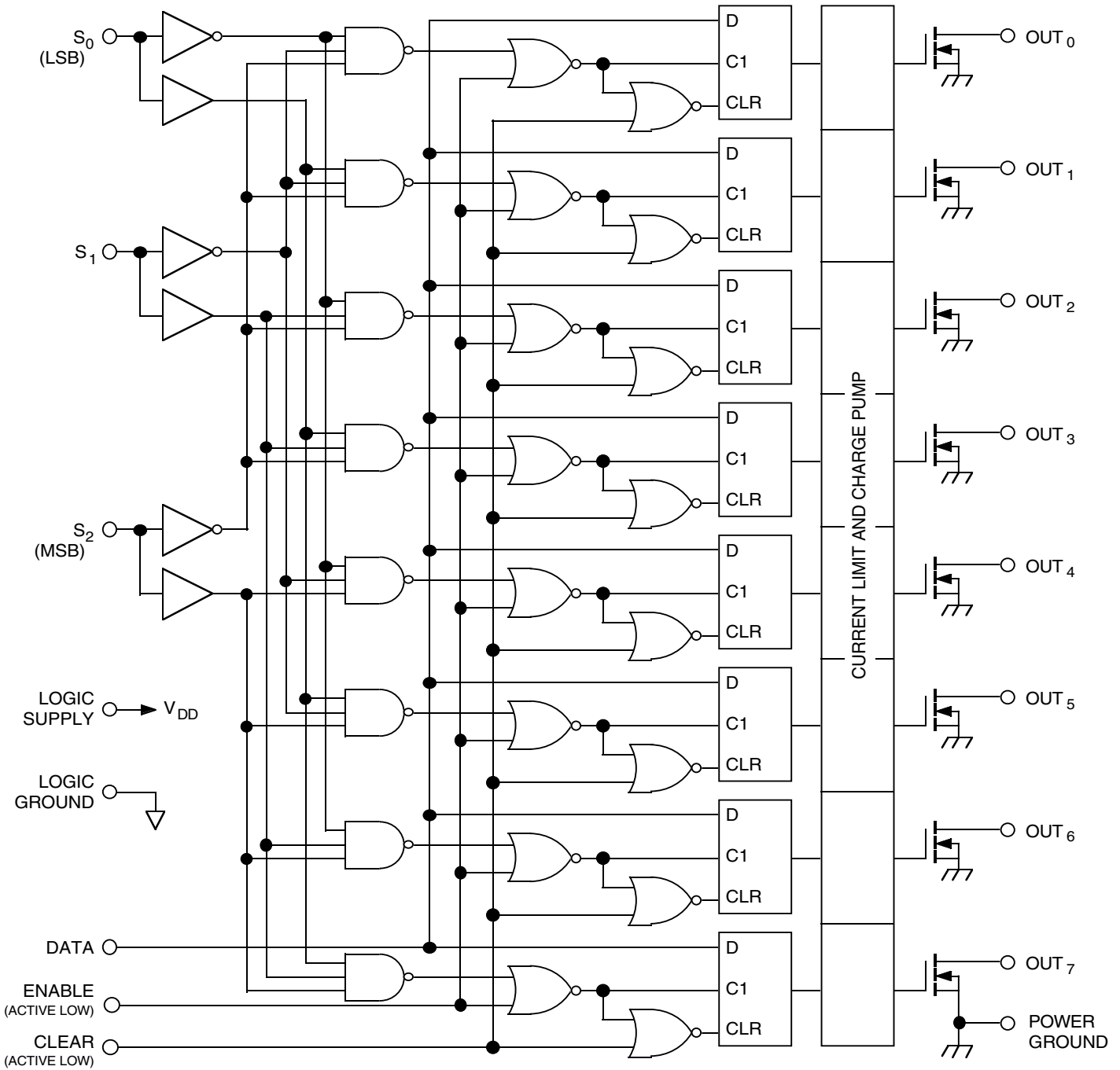
Select Inputs			Addressed OUTPUT
S ₂ (MSB)	S ₁	S ₀ (LSB)	
L	L	L	0
L	L	H	1
L	H	L	2
L	H	H	3
H	L	L	4
H	L	H	5
H	H	L	6
H	H	H	7

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

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FUNCTIONAL BLOCK DIAGRAM



Dwg. FP-047-2

Power grounds 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			
			Min.	Typ.	Max.	Units
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}	$V_O = 40\text{ V}$	—	0.1	1.0	μA
		$V_O = 40\text{ V}$, $T_A = 125^\circ\text{C}$	—	0.2	5.0	μA
Static Drain-Source On-State Resistance	$r_{DS(on)}$	$I_O = 350\text{ mA}$	—	1.0	1.5	Ω
		$I_O = 350\text{ mA}$, $T_A = 125^\circ\text{C}$	—	1.7	2.5	Ω
Source-to-Drain Diode Voltage	V_{SD}	$I_F = 350\text{ mA}$	—	1.0	—	V
Nominal Output Current	$I_{O(nom)}$	$V_{DS(on)} = 0.5\text{ V}$, $T_A = 85^\circ\text{C}$	—	350	—	mA
Output Current	$I_{O(chop)}$	I_O at which chopping starts, $T_C = 25^\circ\text{C}$	0.6	0.8	1.1	A
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}	$I_O = 350\text{ mA}$, $C_L = 30\text{ pF}$	—	100	—	ns
	t_{PHL}	$I_O = 350\text{ mA}$, $C_L = 30\text{ pF}$	—	60	—	ns
Output Rise Time	t_r	$I_O = 350\text{ mA}$, $C_L = 30\text{ pF}$	—	55	—	ns
Output Fall Time	t_f	$I_O = 350\text{ mA}$, $C_L = 30\text{ pF}$	—	40	—	ns
Supply Current	$I_{DD(off)}$	$V_{DD} = 5.5\text{ V}$, Outputs OFF	—	15	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.

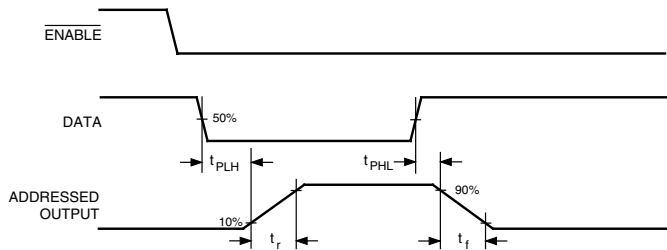
NOTE — Pulse test, duration $\leq 100\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.



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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.

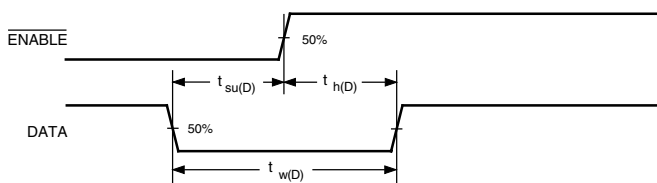
In the addressable-latch mode, data at the DATA input is written into the addressed transparent latch. The addressed output inverts the data input with all other outputs remaining in their previous states.

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.

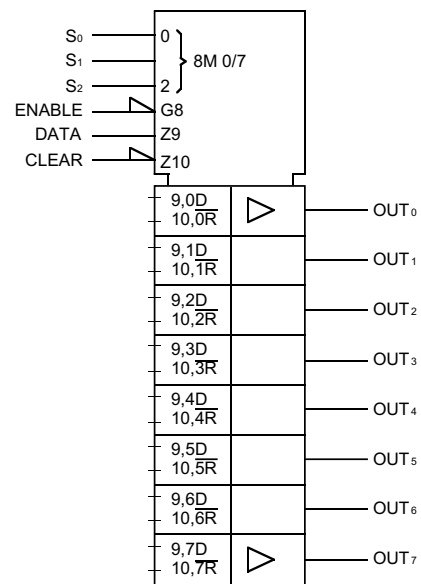


Dwg. WP-037

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} $\geq 0.85V_{DD}$
- Input Logic Low, V_{IL} $\leq 0.15V_{DD}$

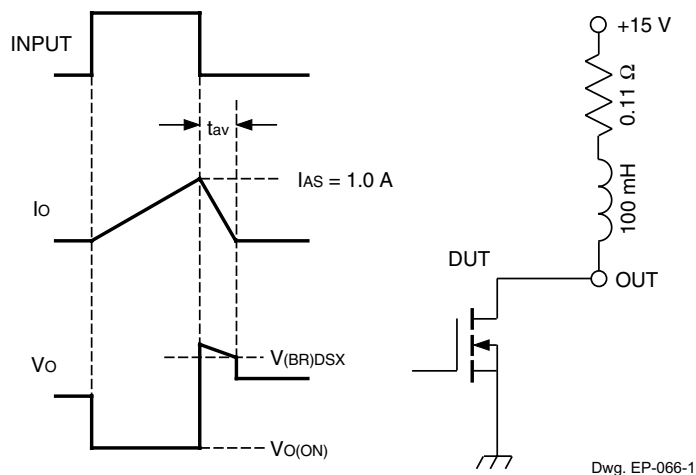
LOGIC SYMBOL



Dwg. FP-046-2

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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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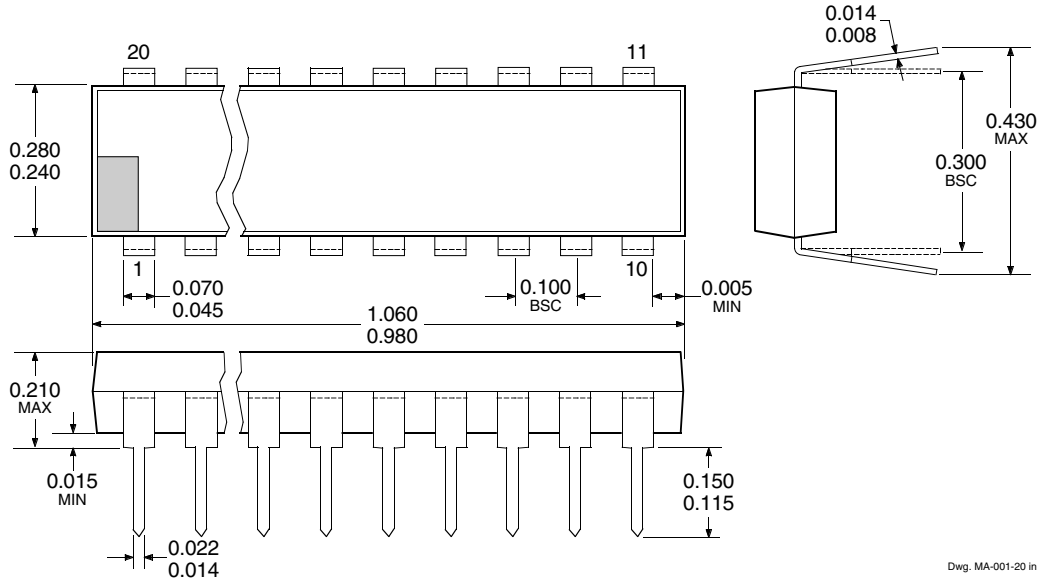
TERMINAL DESCRIPTIONS

A6A259KA (DIP) Terminal No.	A6A259KLB (SOIC) Terminal No.	Terminal Name	Function
1	1	OUT ₂	Current-sinking, open-drain DMOS output, address 010.
2	2	OUT ₃	Current-sinking, open-drain DMOS output, address 011.
3	3	S ₁	Binary-coded output-select input.
4	4	LOGIC GROUND	Reference terminal for input voltage measurements.
5	5, 6	POWER GROUND	Reference terminal for output voltage measurements (OUT ₀₋₃).
6	7, 8	POWER GROUND	Reference terminal for output voltage measurements (OUT ₄₋₇).
7	9	S ₂	Binary-coded output-select input, most-significant bit.
8	10	ENABLE	Mode control input; see Function Table.
9	11	OUT ₄	Current-sinking, open-drain DMOS output, address 100.
10	12	OUT ₅	Current-sinking, open-drain DMOS output, address 101.
11	13	OUT ₆	Current-sinking, open-drain DMOS output, address 110.
12	14	OUT ₇	Current-sinking, open-drain DMOS output, address 111.
13	15	DATA	CMOS data input to the addressed output latch. When enabled, the addressed output inverts the data input (DATA = HIGH, OUTPUT = LOW).
14	16	CLEAR	Mode control input; see Function Table.
15	17, 18	POWER GROUND	Reference terminal for output voltage measurements (OUT ₄₋₇).
16	19, 20	POWER GROUND	Reference terminal for output voltage measurements (OUT ₀₋₃).
17	21	LOGIC SUPPLY	(V _{DD}) The logic supply voltage (typically 5 V).
18	22	S ₀	Binary-coded output-select input, least-significant bit.
19	23	OUT ₀	Current-sinking, open-drain DMOS output, address 000.
20	24	OUT ₁	Current-sinking, open-drain DMOS output, address 001.

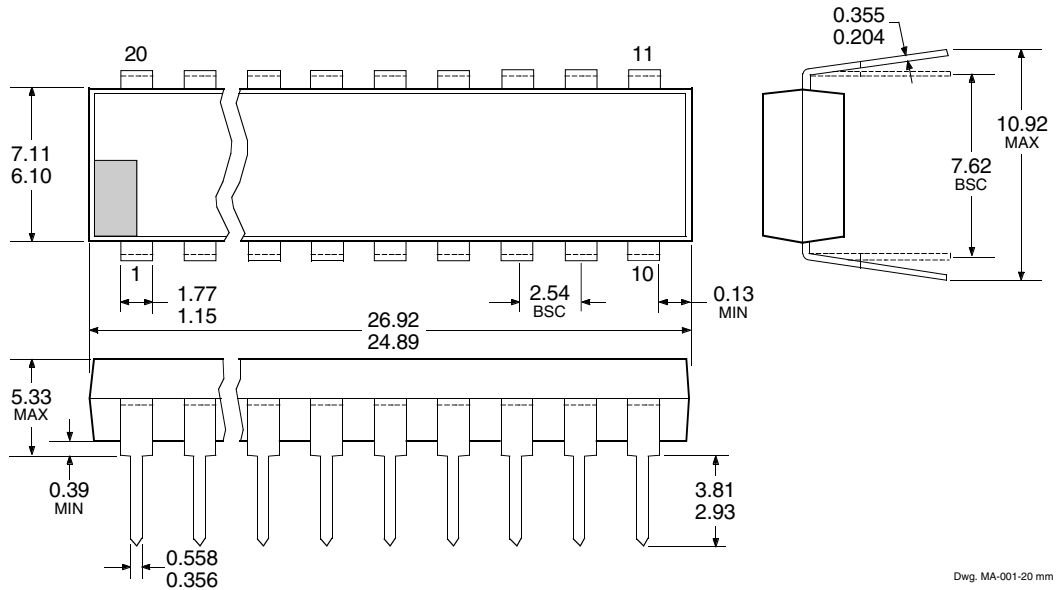
NOTE — Power grounds must be connected together externally.

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A6A259KA
 Dimensions in Inches
 (controlling dimensions)



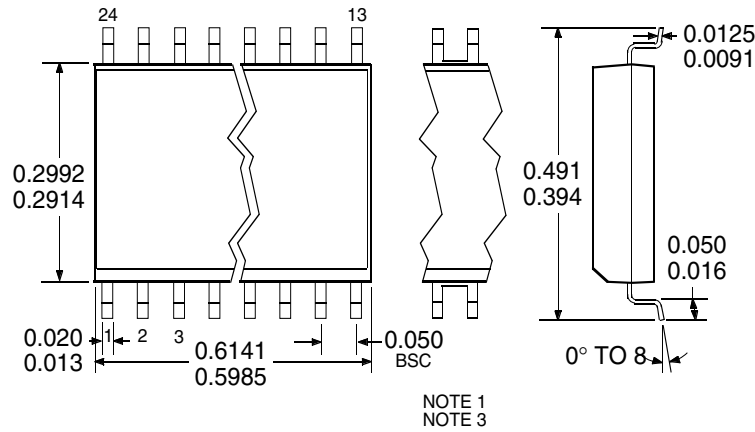
Dimensions in Millimeters
 (for reference only)



- 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.

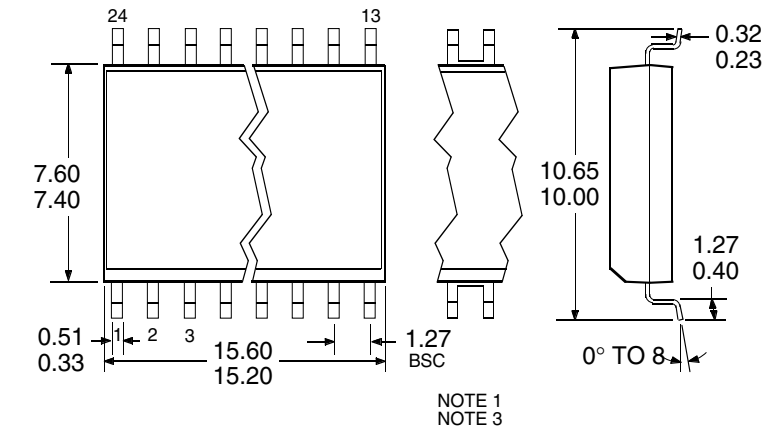
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A6A259KLB Dimensions in Inches (for reference only)



Dwg. MA-008-25 in

Dimensions in Millimeters (controlling dimensions)



Dwg. MA-008-25A mm

- NOTES: 1. Webbed lead frame. Leads 6, 7, 18, and 19 are internally one piece.
 2. Lead spacing tolerance is non-cumulative.
 3. Exact body and lead configuration at vendor's option within limits shown.

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