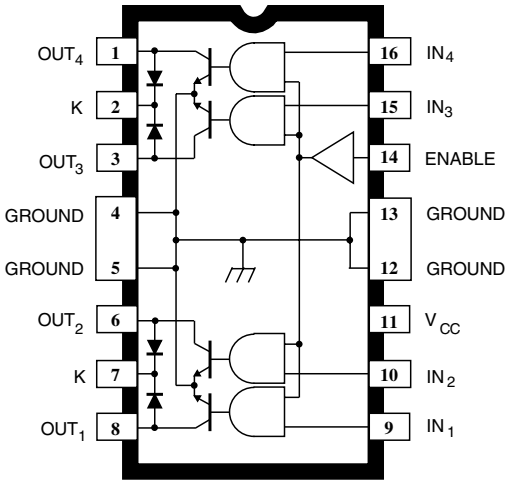
# 2543

Data Sheet
29317.2B

# *PROTECTED QUAD POWER DRIVER*

## UDN/UDQ2543B




Dwg. PP-017-1

### ABSOLUTE MAXIMUM RATINGS
**at $T_A$ = 25°C**

Output Voltage, $V_{OUT}$ . . . . . **60 V**
Over-Current Protected Output Voltage, $V_{OUT}$ . . . . . **25 V**
Output Current, $I_{OUT}$ . . . . . **1.0 A***
Supply Voltage, $V_{CC}$ . . . . . **7.0 V**
Input Voltage, $V_{IN}$ or $V_{EN}$ . . . . . **18 V**
Package Power Dissipation, $P_D$ . . . . . **See Graph**
Operating Temperature Range, $T_A$
(UDN2543B/EB) . . . . **-20°C to +85°C**
(UDQ2543B/EB) . . . . **-40°C to +85°C**
Storage Temperature Range, $T_S$ . . . . . **-55°C to +150°C**

*Outputs are peak current limited at approximately 1.0 A per driver. See Circuit Description and Applications for further information.

Providing interface between low-level logic and power loads to 100 W, the UDx2543B and UDx2543EB quad power drivers combine AND logic gates and high-current bipolar outputs. Each of the four independent outputs can sink up to 700 mA in the ON state. The outputs have a minimum breakdown voltage (load dump) of 60 V and a sustaining voltage of 35 V. The inputs are compatible with most TTL, DTL, LSTTL, and 5 V CMOS and PMOS logic systems.

Over-current protection has been designed into each channel of the UDx2543B/EB and typically occurs at 1 A. It protects any one channel from output short circuits with supply voltages up to 25 V. When the maximum output current is reached, that output stage is driven linearly. If the over-current condition continues, that output's thermal limiting will operate, limiting that output's power dissipation to approximately 2.4 W. The outputs also include diodes for voltage clamping with inductive loads such as relays, solenoids, or dc stepper motors.

These devices are supplied in a 16-pin power DIP of batwing construction (suffix 'B') to provide for maximum package power dissipation. They are also available in a 28-lead PLCC (suffix 'EB') for surface-mount applications. All devices are rated for continuous operation over the temperature range of -20°C to +85°C (UDN2543B/EB) or for use in automotive applications over an extended temperature range as the UDQ2543B/EB.

### FEATURES

- 700 mA Output Current per Channel
- Low Output-Saturation Voltage
- Integral Output Transient-Suppression Diodes
- TTL, CMOS, PMOS, NMOS Compatible Inputs
- Independent Over-Current Protection for Each Output

Always order by complete part number:

| Part Number | Package | Operating Temperature |
|---|---|---|
| UDN2543B | 16-Pin DIP | -20°C to +85°C |
| UDN2543EB | 28-Lead PLCC | -20°C to +85°C |
| UDQ2543B | 16-Pin DIP | -40°C to +85°C |
| UDQ2543EB | 28-Lead PLCC | -40°C to +85°C |

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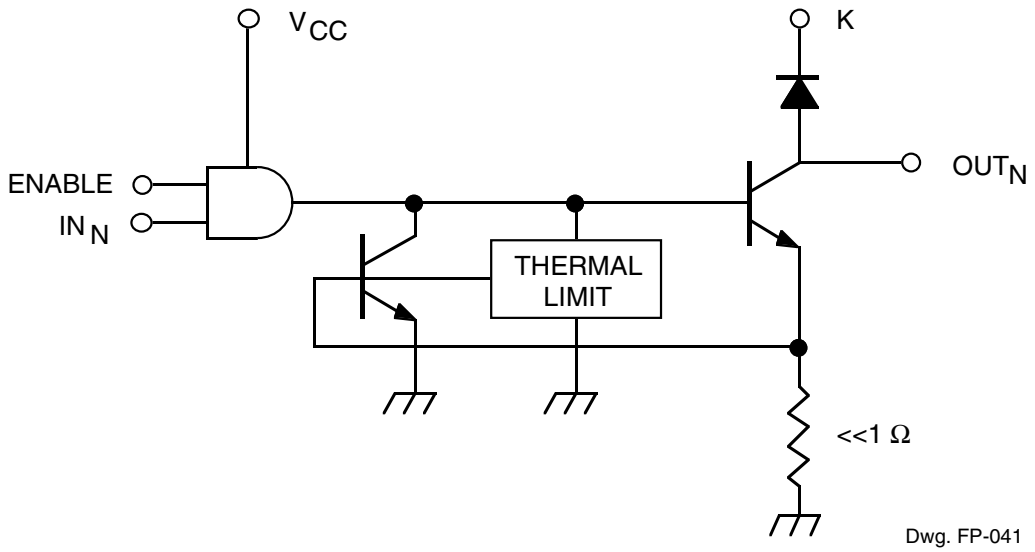
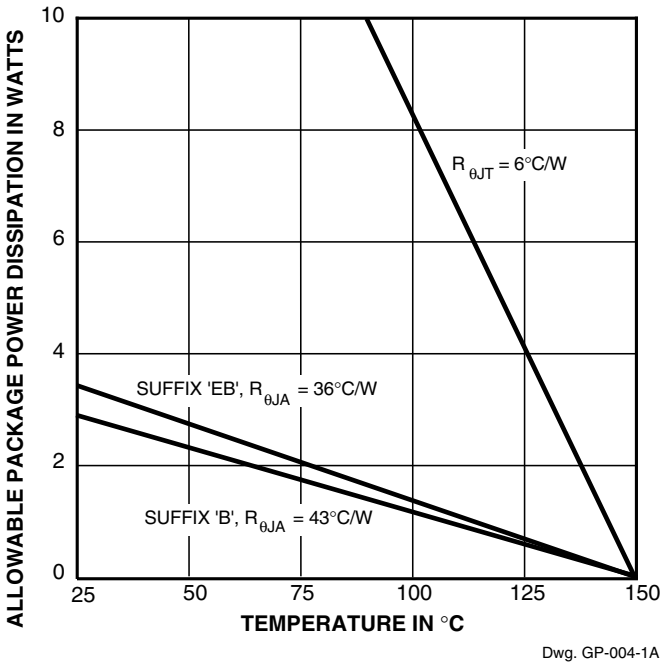
### FUNCTIONAL BLOCK DIAGRAM
**(1 OF 4 CHANNELS)**




Dwg. FP-041

NOTE: These devices do not include an absolute thermal shutdown. Package power dissipation under fault conditions (2.4 W in the faulted channel) must therefore be evaluated at maximum operating temperature.

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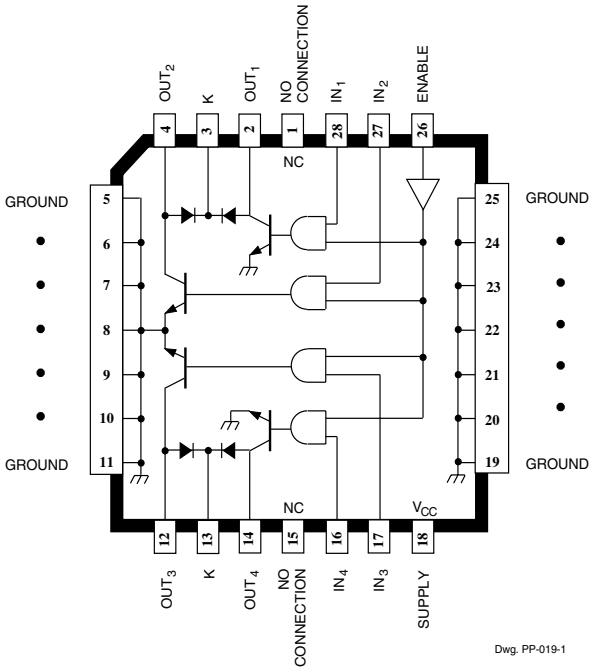
### UDN/UDQ2543EB

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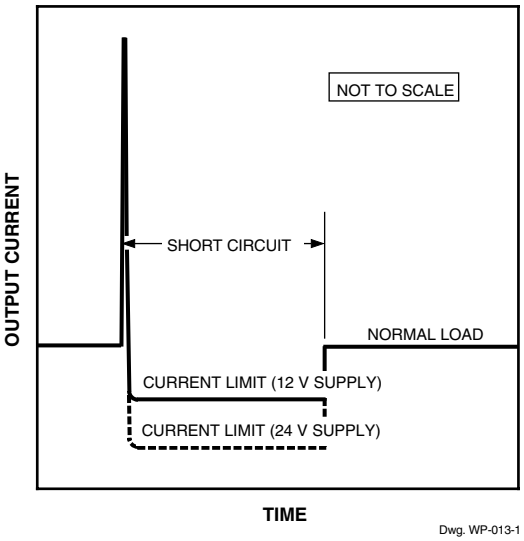
## ELECTRICAL CHARACTERISTICS at $T_A$ = +25°C (UDN2543B/EB) or over operating temperature range (UDQ2543B/EB only), $V_{CC}$ = 4.75 V to 5.25 V

| Characteristic | Symbol | Test Conditions | Limits | | |
|---|---|---|---|---|---|
| | | | Min. | Max. | Units |
| Output Leakage Current | $I_{CEX}$ | $V_{OUT}$ = 60 V, $V_{IN}$ = 0.8 V, $V_{EN}$ = 2.0 V | — | 100 | µA |
| | | $V_{OUT}$ = 60 V, $V_{IN}$ = 2.0 V, $V_{EN}$ = 0.8 V | — | 100 | µA |
| Output Sustaining Voltage | $V_{OUT(SUS)}$ | $I_{OUT}$ = 100 mA, $V_{IN}$ = $V_{EN}$ = 0.8 V | 35 | — | V |
| Output Saturation Voltage | $V_{OUT(SAT)}$ | $I_{OUT}$ = 100 mA, $V_{IN}$ = $V_{EN}$ = 2.0 V | — | 200 | mV |
| | | $I_{OUT}$ = 400 mA, $V_{IN}$ = $V_{EN}$ = 2.0 V | — | 400 | mV |
| | | $I_{OUT}$ = 700 mA, $V_{IN}$ = $V_{EN}$ = 2.0 V | — | 600 | mV |
| Input Voltage | Logic 1 | $V_{IN(1)}$ or $V_{EN(1)}$ | 2.0 | — | V |
| | Logic 0 | $V_{IN(0)}$ or $V_{EN(0)}$ | — | 0.8 | V |
| Input Current | Logic 1 | $V_{IN(1)}$ or $V_{EN(1)}$ = 2.0 V | — | 20 | µA |
| | Logic 0 | $V_{IN(0)}$ or $V_{EN(0)}$ = 0.8 V | — | -10 | µA |
| Total Supply Current | $I_{CC}$ | $I_{OUT}$ = 700 mA*, $V_{IN}$† = $V_{EN}$ = 2.0 V | — | 65 | mA |
| | | Outputs Open, $V_{IN}$† = 0.8 V, $V_{EN}$ = 2.0 V | — | 15 | mA |
| Clamp Diode Forward Voltage | $V_F$ | $I_F$ = 1.0 A | — | 1.6 | V |
| | | $I_F$ = 1.5 A | — | 2.0 | V |
| Clamp Diode Leakage Current | $I_R$ | $V_R$ = 60 V, $V_{IN}$ = $V_{EN}$ = 2.0 V, $D_1 + D_2$ or $D_3 + D_4$ | — | 50 | µA |

Negative current is defined as coming out of (sourcing) the specified terminal.
As used here, -100 is defined as greater than +10 (absolute magnitude convention) and the minimum is implicitly zero.
* Pulse test, allowable package power dissipation will be exceeded at increased ambient temperatures.
† All inputs simultaneously, all other tests are performed with each input tested separately.

## TYPICAL OUTPUT BEHAVIOR




Dwg. WP-013-1

## CIRCUIT DESCRIPTION AND APPLICATION

### INCANDESCENT LAMP DRIVER

For incandescent lamp applications, the UDx2549B/EB or UDx2559B/EB, with improved shortcircuit protection and thermal limiting, are recommended.

### INDUCTIVE LOAD DRIVER

Bifilar (unipolar) stepper motors, relays, or solenoids can be driven directly. The internal flyback diodes prevent damage to the output transistors by suppressing the high-voltage spikes that occur when turning OFF an inductive load. For rapid current decay (fast turn-OFF speeds), the use of Zener diodes will raise the flyback voltage and improve performance. However, the peak voltage must not exceed the specified minimum sustaining voltage ($V_{SUPPLY} + V_Z + V_F \le V_{OUT(SUS)}$).

### FAULT CONDITIONS

In the event of a shorted load, the load current will attempt to increase. As described above, the drive current to the affected output stage is diverted, causing the output stage to go linear, limiting the peak output current to approximately 1 A. As the power dissipation of that output stage increases, a thermal gradient sensing circuit will become operational, further decreasing the drive current to the affected output stage and reducing the output current to a value dependent on supply voltage ($I_{OUT} \approx 2.4/V_{SUPPLY}$). If the fault condition is corrected, the output stage will return to its normal saturated condition.

Due to the independent operation of the four channels, only a single channel should be shorted at a time. Multiple overload conditions may be tolerated provided rated package power dissipation is not exceeded.

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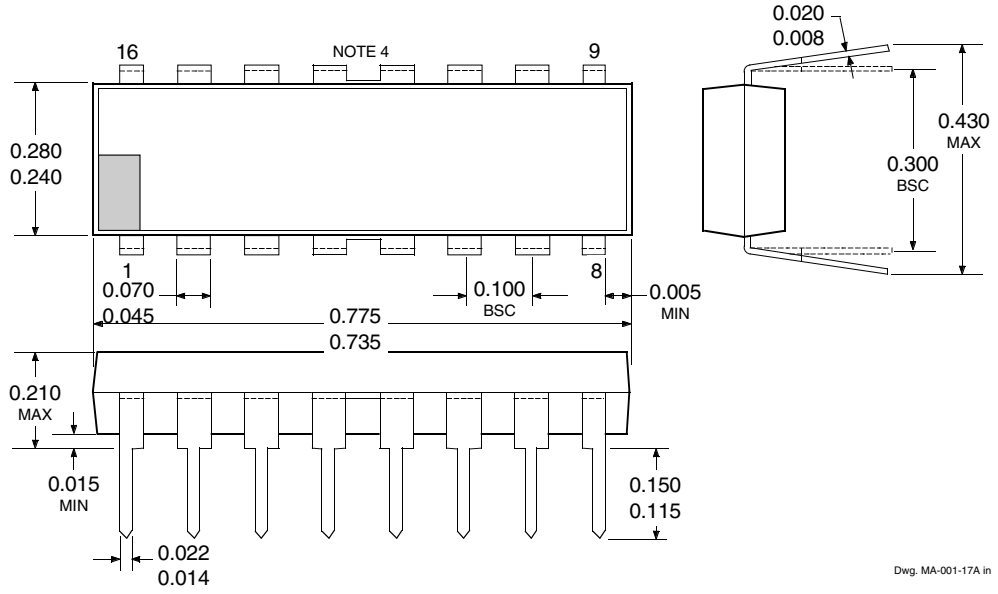
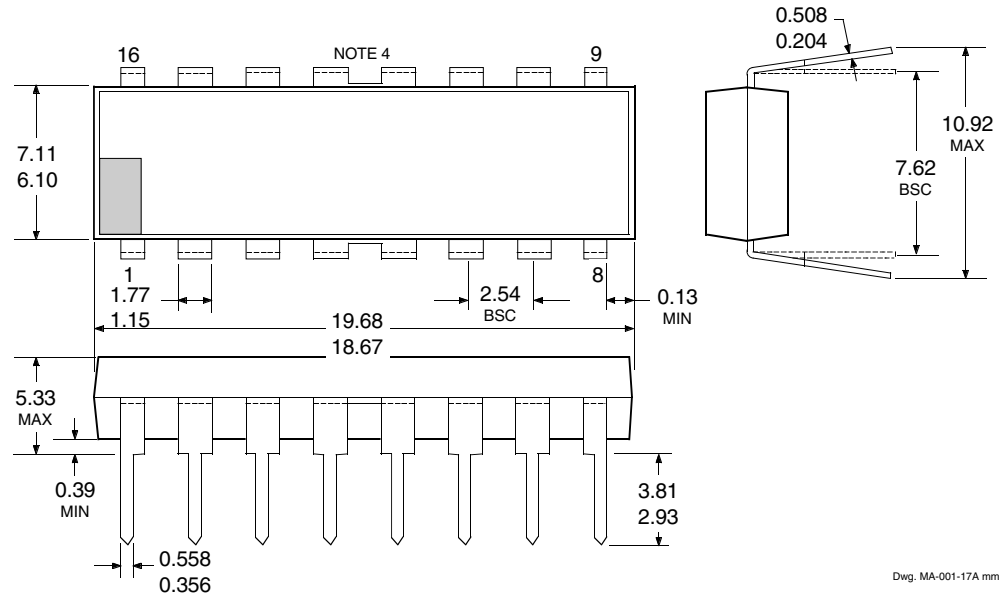
**UDN2543B and UDQ2543B**
Dimensions in Inches
(controlling dimensions)




Dwg. MA-001-17A in

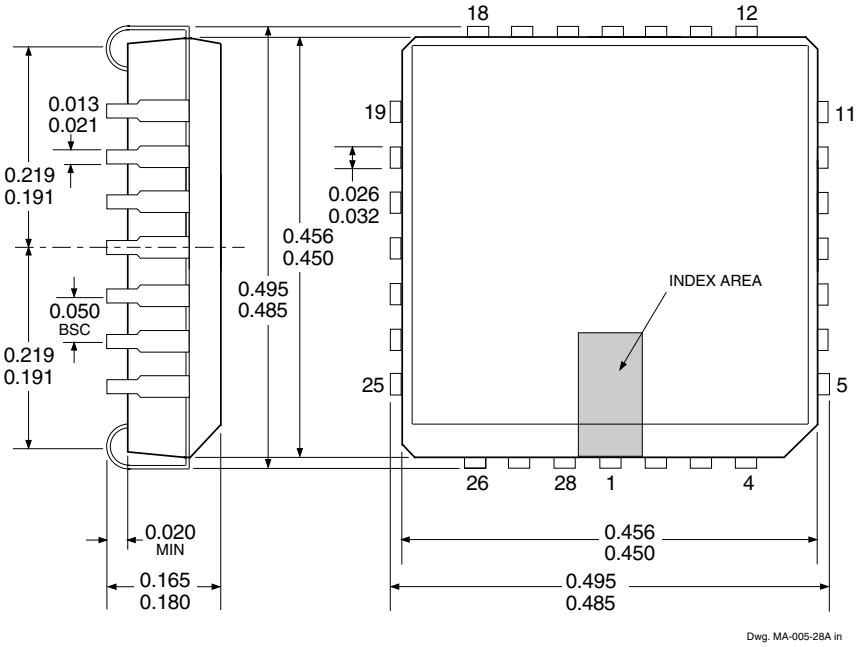
Dimensions in Millimeters
(for reference only)




Dwg. MA-001-17A mm

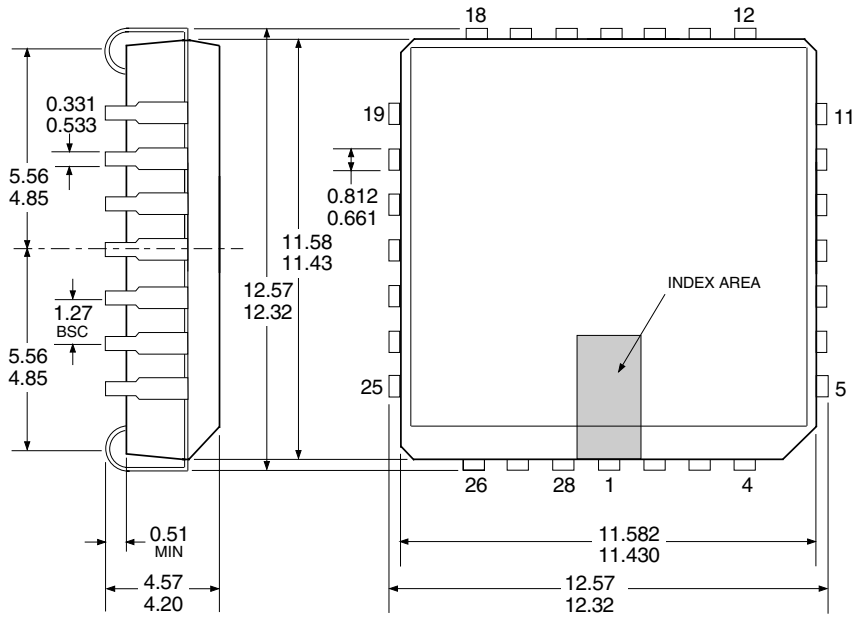
NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
2. Lead spacing tolerance is non-cumulative
3. Lead thickness is measured at seating plane or below.
4. Webbed lead frame. Leads 4, 5, 12, and 13 are internally one piece.

**UDN2543EB and UDQ2543EB**
Dimensions in Inches
(controlling dimensions)




Dwg. MA-005-28A in

Dimensions in Millimeters
(for reference only)




Dwg. MA-005-28A mm

NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
2. Lead spacing tolerance is non-cumulative
3. Webbed lead frame. Leads 5 through 11 and 19 through 25 are internally one piece.

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# *PROTECTED QUAD POWER DRIVER*

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## *PROTECTED QUAD POWER DRIVER*

## *POWER SINK DRIVERS*

**IN ORDER OF 1) OUTPUT CURRENT, 2) OUTPUT VOLTAGE, 3) NUMBER OF DRIVERS**

| Output Ratings * | | | Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| mA | V | # | Serial Input | Latched Drivers | Diode Clamp | Outputs | Internal Protection | Part Number† |
| 75 | 17 | 8 | X | X | – | constant current | – | 6275 |
| | 17 | 16 | X | X | – | constant current | – | 6276 |
| 100 | 20 | 8 | – | – | – | saturated | – | 2595 |
| | 30 | 32 | X | X | – | – | – | 5833 |
| | 40 | 32 | X | X | – | saturated | – | 5832 |
| | 50 | 8 | addressable decoder/driver | | | DMOS | – | 6B259 |
| | 50 | 8 | – | X | – | DMOS | – | 6B273 |
| | 50 | 8 | X | X | – | DMOS | – | 6B595 |
| 250 | 50 | 8 | addressable decoder/driver | | | DMOS | – | 6259 |
| | 50 | 8 | – | X | – | DMOS | – | 6273 |
| | 50 | 8 | X | X | – | DMOS | – | 6595 |
| | 135 | 7 | – | – | X | – | – | 7003 |
| 300 | 45 | 1 | – | Hall sensor/driver | X | – | X | 5140 |
| | 50 | 7 | – | – | X | – | – | 2003 |
| | 50 | 8 | – | – | X | – | – | 2803 |
| | 50 | 8 | – | – | X | saturated | – | 2596 |
| | 60 | 4 | – | – | X | saturated | X | 2557 |
| | 95 | 7 | – | – | X | – | – | 2023 |
| | 95 | 8 | – | – | X | – | – | 2823 |
| 350 | 50 | 4 | – | X | X | – | – | 5800 |
| | 50 | 7 | – | – | X | – | – | 2004 |
| | 50 | 8 | – | – | X | – | – | 2804 |
| | 50 | 8 | – | X | X | – | – | 5801 |
| | 50 | 8 | X | X | – | – | – | 5821 |
| | 50 | 8 | X | X | X | – | – | 5841 |
| | 50 | 8 | addressable decoder/driver | | | DMOS | – | 6A259 |
| | 50 | 8 | X | X | – | DMOS | – | 6A595 |
| | 80 | 8 | X | X | – | – | – | 5822 |
| | 80 | 8 | X | X | X | – | – | 5842 |
| | 95 | 7 | – | – | X | – | – | 2024 |
| | 95 | 8 | – | – | X | – | – | 2824 |
| 450 | 30 | 28 | dual 4- to 14-line decoder/driver | | | – | – | 6817 |
| 600 | 60 | 4 | – | – | – | saturated | X | 2547 |
| | 60 | 4 | – | – | X | saturated | X | 2549 |
| 700 | 60 | 4 | – | – | X | saturated | X | 2543 and 2559 |
| 750 | 50 | 8 | – | – | X | saturated | – | 2597 |
| 900 | 14 | 2 | – | Hall sensor/driver | X | saturated | X | 3625 |
| | 26 | 2 | – | Hall sensor/driver | X | saturated | X | 3626 |
| 1000 | 46 | 4 | stepper motor controller/driver | | | MOS | – | 7024 and 7029 |
| 1200 | 46 | 4 | microstepping controller/driver | | | MOS | – | 7042 |
| 1250 | 50 | 4 | stepper motor translator/driver | | | – | X | 5804 |
| | 50 | 4 | – | – | X | – | – | 2064 and 2068 |
| 1500 | 80 | 4 | – | – | X | – | – | 2065 and 2069 |
| 1800 | 50 | 4 | – | – | X | – | – | 2544 |
| | 50 | 4 | – | – | X | – | – | 2540 |
| 3000 | 46 | 4 | stepper motor controller/driver | | | MOS | – | 7026 |
| | 46 | 4 | microstepping controller/driver | | | MOS | – | 7044 |
| 4000 | 50 | 4 | – | – | X | – | – | 2878 |
| | 80 | 4 | – | – | X | – | – | 2879 |

* Current is maximum specified test condition, voltage is maximum rating. See specification for sustaining voltage limits or over-current protection voltage limits.

† Complete part number includes additional characters to indicate operating temperature range and package style.

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