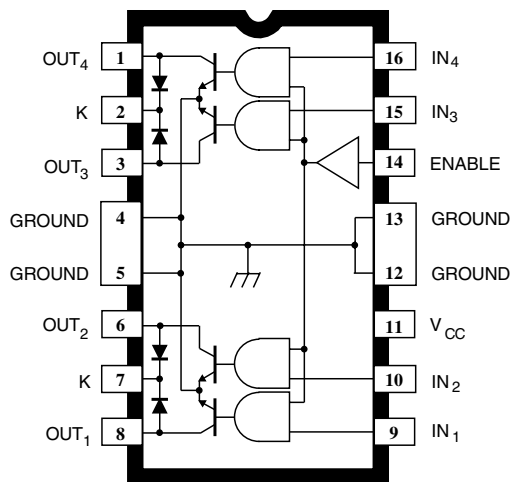


# 2543

## PROTECTED QUAD POWER DRIVER

**UDN/UDQ2543B**



Dwg. PP-017-1

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

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) ....	$-20^\circ\text{C}$ to $+85^\circ\text{C}$
(UDQ2543B/EB) ....	$-40^\circ\text{C}$ to $+85^\circ\text{C}$
Storage Temperature Range, $T_S$ .....	$-55^\circ\text{C}$ to $+150^\circ\text{C}$

\*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  $-20^\circ\text{C}$  to  $+85^\circ\text{C}$  (UDN2543B/EB) or for use in automotive applications over an extended temperature range as the UDQ2543B/EB.

### FEATURES

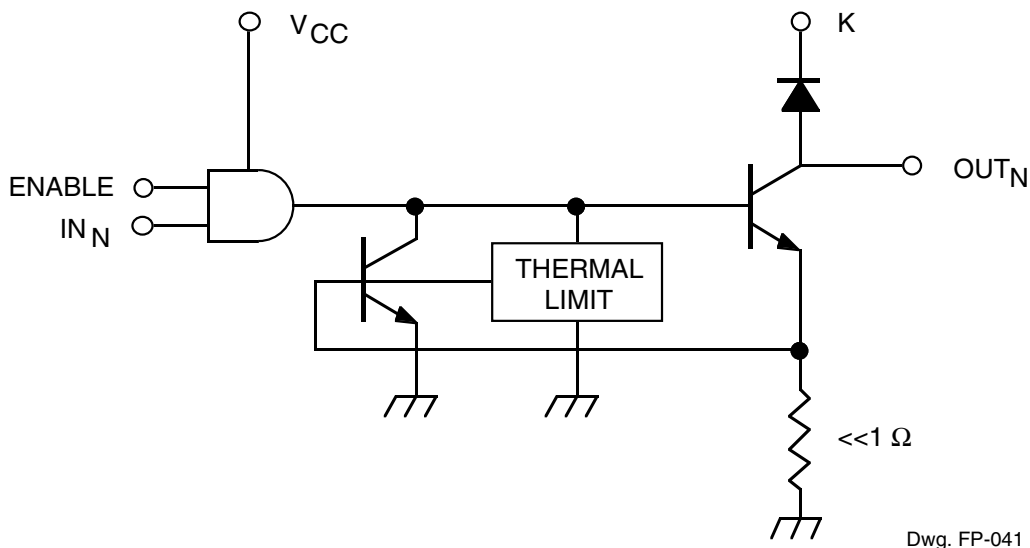
- 700 mA Output Current per Channel
- Low Output-Saturation Voltage
- Integral Output Transient-Suppression Diodes
- TTL, CMOS, PMOS, NMOS Compatible Inputs
- Independent Over-Current Protection for Each Output

Always order by complete part number:

Part Number	Package	Operating Temperature
UDN2543B	16-Pin DIP	$-20^\circ\text{C}$ to $+85^\circ\text{C}$
UDN2543EB	28-Lead PLCC	$-20^\circ\text{C}$ to $+85^\circ\text{C}$
UDQ2543B	16-Pin DIP	$-40^\circ\text{C}$ to $+85^\circ\text{C}$
UDQ2543EB	28-Lead PLCC	$-40^\circ\text{C}$ to $+85^\circ\text{C}$

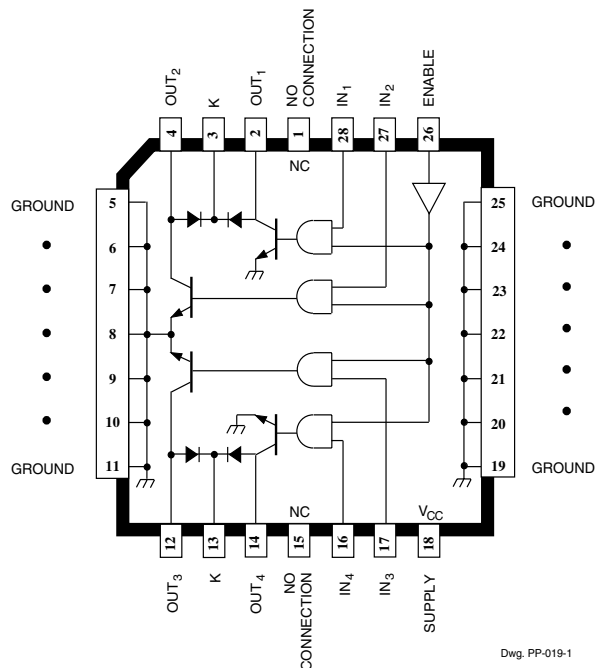
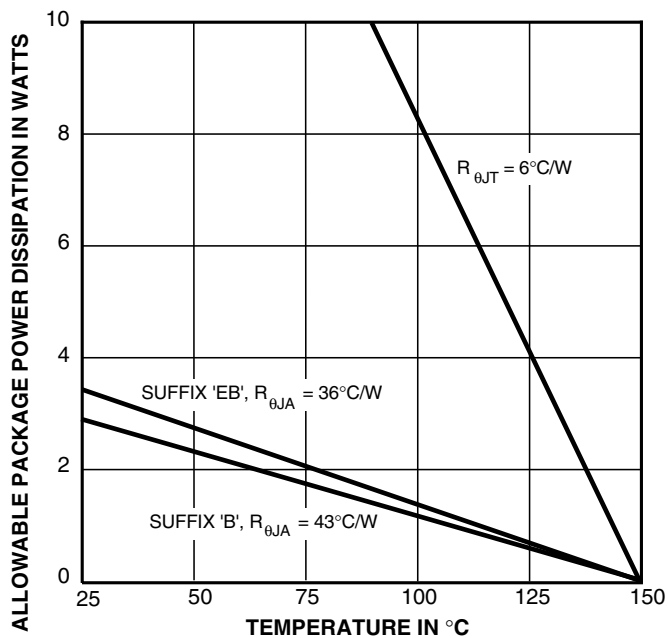
# 2543 PROTECTED QUAD POWER DRIVER

## FUNCTIONAL BLOCK DIAGRAM (1 OF 4 CHANNELS)



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.

## UDN/UDQ2543EB



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

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

Negative current is defined as coming out of (sourcing) the specified terminal.

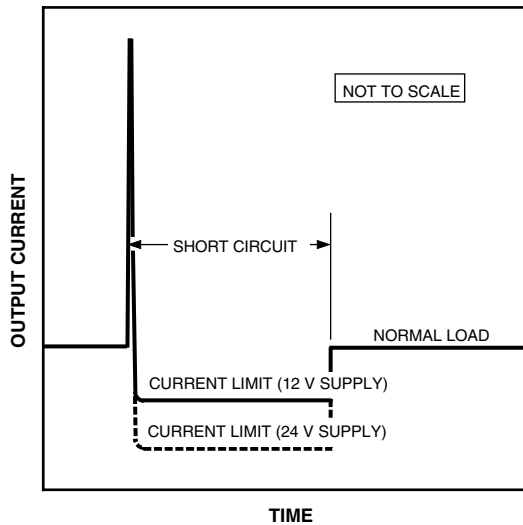
As used here, -100 is defined as greater than +10 (absolute magnitude convention) and the minimum is implicitly zero.

\* 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.

# 2543 PROTECTED QUAD POWER DRIVER

## TYPICAL OUTPUT BEHAVIOR



## 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 ( $V_{\text{SUPPLY}} + V_Z + V_F \leq V_{\text{OUT(SUS)}}$ ).

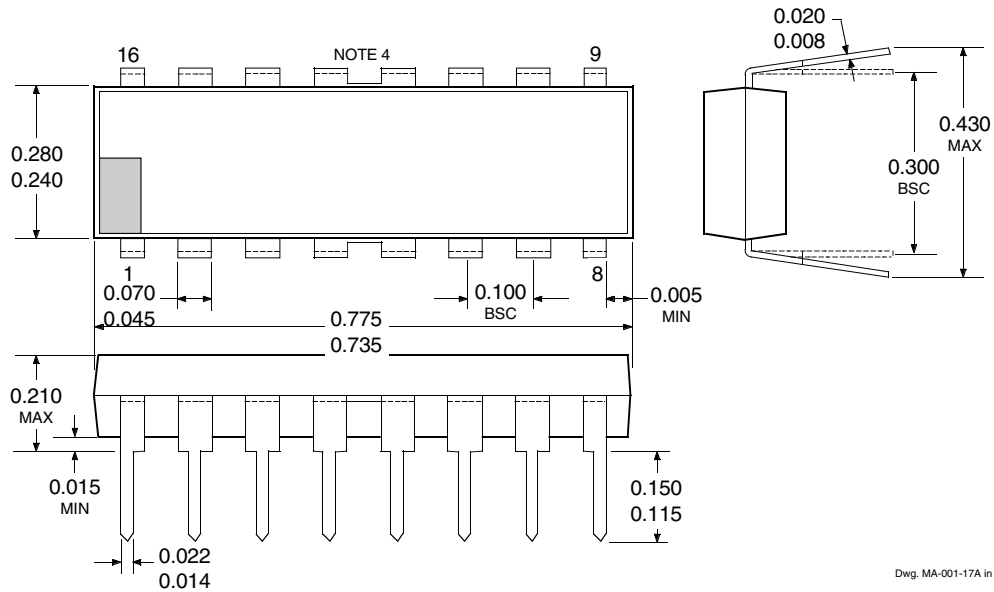
### FAULT CONDITIONS

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 ( $I_{\text{OUT}} \approx 2.4/V_{\text{SUPPLY}}$ ). If the fault condition is corrected, the output stage will return to its normal saturated condition.

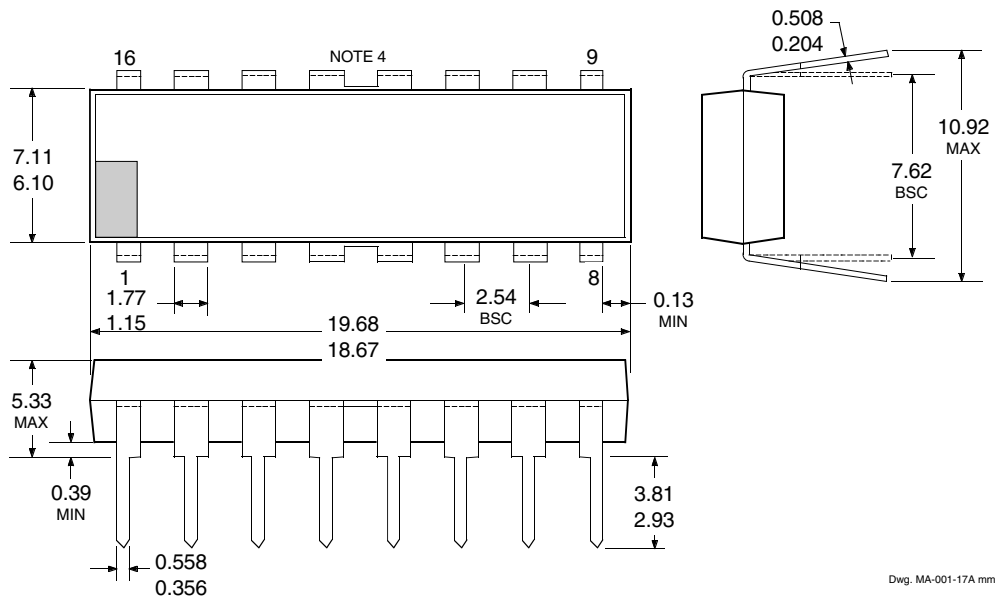
Due to the independent operation of the four channels, only a single channel should be shorted at a time. Multiple overload conditions may be tolerated provided rated package power dissipation is not exceeded.

# 2543 PROTECTED QUAD POWER DRIVER

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



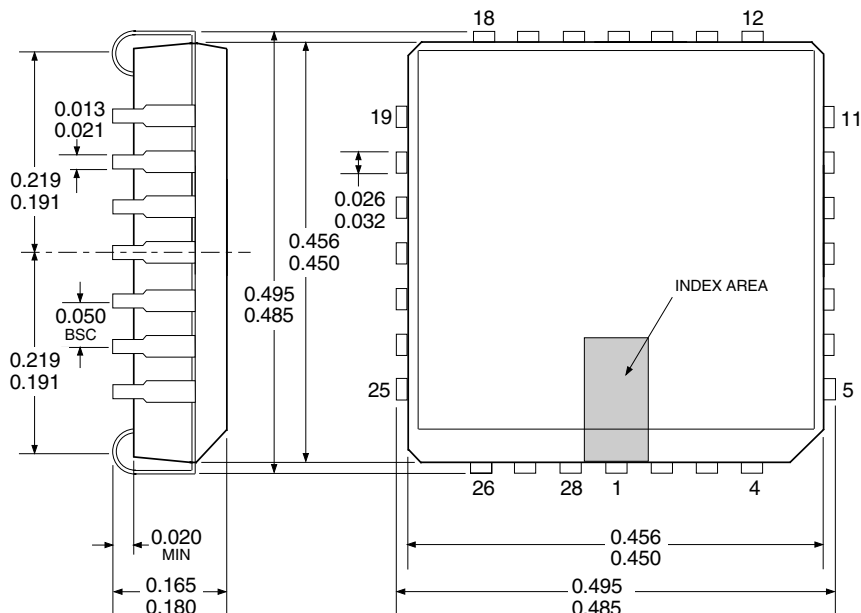
## Dimensions in Millimeters (for reference only)



- 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.  
 4. Webbed lead frame. Leads 4, 5, 12, and 13 are internally one piece.

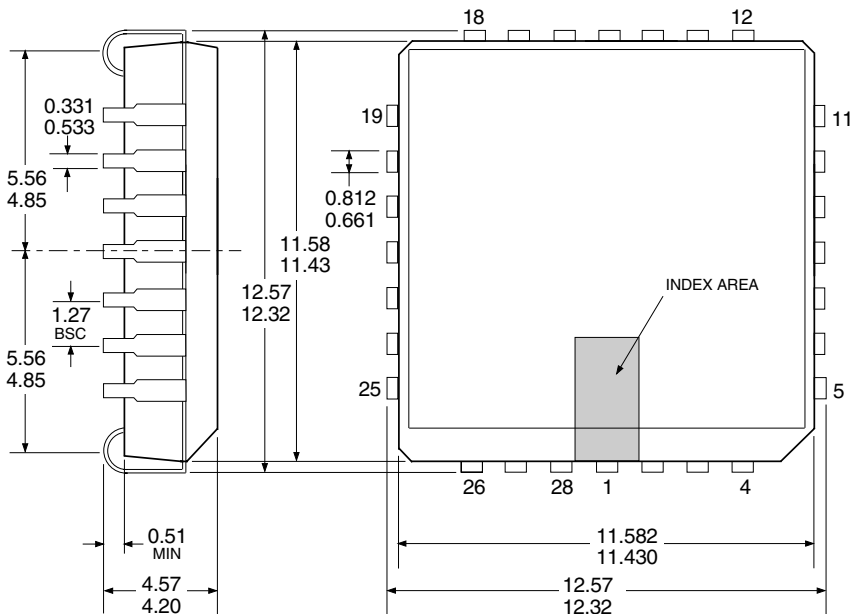
# 2543 PROTECTED QUAD POWER DRIVER

**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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# 2543 PROTECTED QUAD POWER DRIVER

## POWER SINK DRIVERS

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

Output Ratings *			Features					Part Number <sup>†</sup>
mA	V	#	Serial Input	Latched Drivers	Diode Clamp	Outputs	Internal Protection	
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	–	–
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		–	–	–
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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