

D 345 D / D 346 D / D 347 D / D 348 D

E 345 D / E 346 D / E 347 D / E 348 D

BCD-to-7-Segment Decoder / Driver

Package: DIP-16, Plastic

Type standard: TGL 26713 (21.1.1.2.16)

D-Type: Operating temperature 0 to +70 degC

E-Type: Operating temperature -25 to +85 degC

Package Dimensions (DIP-16, Plastic)

Length: 19.5 max.

Width: 7.5 +/- 0.125

Height: 4.5 (+0.5 / -0.25)

Pin spacing: 2.5 +/- 0.125

Pin width: 0.45 (+0.1 / -0.15)

Pin thickness: 0.25 (+0.15 / -0.1)

Lead angle: 0...15 degrees

Pin Assignment (DIP-16)

Pin	Function
1	B (BCD input B)
2	C (BCD input C)
3	LT (Lamp Test)
4	BI/RBO (Blanking Input / Ripple Blanking Output)
5	RBI (Ripple Blanking Input)
6	D (BCD input D)
7	A (BCD input A)
8	GND (Ground)
9	e (Segment output e)
10	d (Segment output d)
11	c (Segment output c)
12	b (Segment output b)
13	a (Segment output a)
14	g (Segment output g)
15	f (Segment output f)
16	VCC (+Us Supply voltage)

Logic Circuit

Inputs: A, B, C, D (BCD code), LT, RBI, BI/RBO

Outputs: a, b, c, d, e, f, g (7-segment display)

Note: Constant current outputs for D/E 346/348 D are adjustable

Absolute Maximum Ratings

Valid for operating temperature range

Parameter	Symbol	min.	max.	Unit
Supply voltage	Us	0	7	V
H-Output voltage	UOH	0	15	V
L-Output voltage	UOL	0	4	V
L-Output current per output	IOL	7	14	mA
for D 345/347 D				
L-Output current per output	IOL	0	40	mA
for D 346/348 D				
Total power dissipation	Ptot ges.		450	mW
at UOL = 4V for D 345/347 D				
Total power dissipation	Ptot ges.		660	mW
for D 346/348 D				
Power dissipation per output	Ptot a...g		80	mW
Operating temperature range	theta a	0	+70	degC

Operating Conditions

Parameter	Symbol	min.	typ.	max.	Unit
Supply voltage	Us	4.75	5.0	5.25	V
H-Input voltage	UIH	2.0		5.5	V
L-Input voltage	UIL	0		0.8	V
Ambient temperature D-Type	theta a	0	...	+70	degC
Ambient temperature E-Type	theta a	-25	...	+85	degC

Static Characteristics

theta a = 25 degC - 5 K

Parameter	Symbol	min.	typ.	max.	Unit
Supply current at $U_s = 5.25V$ for D 345/347 D	I_s		4	12	mA
Supply current at $U_s = 5.25V$ for D 346/348 D	I_s		8	20	mA
H-Input voltage at $U_s = 4.75V$	U_{IH}	2			V
L-Input voltage at $U_s = 4.75V$	U_{IL}			0.8	V
H-Output voltage - outputs a...g at $U_s = 4.75V$, $I_{OH} = 20 \mu A$	U_{OH}	13			V
L-Output voltage output RBO/BI at $U_s = 4.75V$, $I_{OL} = 4 mA$	U_{OL}		0.08	0.4	V
H-Output voltage output RBO/BI at $U_s = 5.25V$, $I_{OH} = 250 \mu A$	U_{OH}	2.4			V
H-Output current - outputs a...g at $U_s = 4.75V$, $U_{OH} = 15V$	I_{OH}			250	μA
H-Output current - output RBO/BI at $U_s = 5.25V$, $U_{OH} = 2.7V$	I_{OH}			100	μA
L-Input current at $U_s = 5.25V$, $U_{IL} = 0.4V$	$-I_{IL}$		230	400	μA
H-Input current except BI at $U_s = 5.25V$, $U_{IH} = 2.7V$	I_{IH}			20	μA
L-Output current outputs a...g D 345/347 D at $U_s = 5.25V$, $U_{OL} = 4V$	I_{OL}	7		14	mA
L-Output current outputs a...g D 346/348 D at $U_s = 5.25V$, $U_{OL} = 4V$	I_{OL}	0		20	mA

1) For D 346 D, D 348 D the output current is adjustable within the specified range.

Function Table 1: D 345 D, D 346 D

Common cathode display (outputs active Low)

Decimal /	RBI	A	B	C	D	BI/RBO	a	b	c	d	e	f	g	Digit/
Function														Char
0	H	L	L	L	L	H	L	L	L	L	L	L	L	0
1	X	H	L	L	L	H	H	L	L	H	H	H	H	1
2	X	L	H	L	L	H	L	L	H	L	L	H	L	2
3	X	H	H	L	L	H	L	L	L	L	H	H	L	3
4	X	L	L	H	L	H	H	L	L	H	H	L	L	4
5	X	H	L	H	L	H	L	H	L	L	H	L	L	5
6	X	L	H	H	L	H	L	H	L	L	L	L	L	6
7	X	H	H	H	L	H	L	L	L	H	H	L	H	7
8	X	L	L	L	H	H	L	L	L	L	L	L	L	8
9	X	H	L	L	H	H	L	L	L	L	H	L	L	9
10	X	L	H	L	H	H	L	L	L	H	L	L	L	A
11	X	H	H	L	H	H	H	H	L	L	L	L	L	b
12	X	L	L	H	H	H	L	H	H	L	L	L	H	C
13	X	H	L	H	H	H	H	L	L	L	L	H	L	d
14	X	L	H	H	H	H	L	H	H	L	L	L	L	E
15	X	H	H	H	H	H	L	H	H	H	L	L	L	F
BI	X	X	X	X	X	L	H	H	H	H	H	H	H	BI
RBI	L	L	L	L	L	L	H	H	H	H	H	H	H	RBI

Function Table 2: D 347 D, D 348 D

Common anode display (outputs active High)

Decimal /	RBI	A	B	C	D	BI/RBO	a	b	c	d	e	f	g	Digit/
Function														Char
0	H	L	L	L	L	H	L	L	L	L	L	L	L	0
1	X	H	L	L	L	H	H	L	L	H	H	H	H	1
2	X	L	H	L	L	H	L	L	H	L	L	H	L	2
3	X	H	H	L	L	H	L	L	L	L	H	H	L	3
4	X	L	L	H	L	H	H	L	L	H	H	L	L	4
5	X	H	L	H	L	H	L	H	L	L	H	L	L	5
6	X	L	H	H	L	H	L	H	L	L	L	L	L	6
7	X	H	H	H	L	H	L	L	L	H	H	L	H	7
8	X	L	L	L	H	H	L	L	L	L	L	L	L	8
9	X	H	L	L	H	H	L	L	L	L	H	L	L	9
10	X	L	H	L	H	H	L	L	L	H	L	L	L	-
11	X	H	H	L	H	H	H	H	L	L	L	L	L	S
12	X	L	L	H	H	H	L	H	H	L	L	L	H	U
13	X	H	L	H	H	H	H	L	L	L	L	H	L	d
14	X	L	H	H	H	H	L	H	H	L	L	L	L	c
15	X	H	H	H	H	H	L	H	H	H	L	L	L	A
BI	X	X	X	X	X	L	H	H	H	H	H	H	H	BI
RBI	L	L	L	L	L	L	H	H	H	H	H	H	H	RBI

Permissible Operating Range

Total power dissipation P_{tot} vs. ambient temperature T

$P_{tot} \text{ max} = 650 \text{ mW}$ up to $T = 50 \text{ degC}$

P_{tot} derates linearly to 550 mW at $T = 70 \text{ degC}$

Application Circuit Brightness Control

For D 346 / D 348 (adjustable constant current outputs):

Pin 3 (LT) connected via $50 \text{ k}\Omega$ potentiometer to $+U_s$

This allows brightness adjustment of the 7-segment display

Application Circuit Pinout (D346 / D348)

Pin 1	B (BCD input)
Pin 2	C (BCD input)
Pin 3	LT (Lamp Test) - $50 \text{ k}\Omega$ pot to $+U_s$
Pin 4	BI/RBO
Pin 5	RBI
Pin 6	D (BCD input)
Pin 7	A (BCD input)
Pin 8	GND
Pin 9	e (segment)
Pin 10	d (segment)
Pin 11	c (segment)
Pin 12	b (segment)
Pin 13	a (segment)
Pin 14	g (segment)
Pin 15	f (segment)
Pin 16	$+U_s$ (Supply)

Test Circuits

The following test circuits are used for parameter measurement:

1. IOL test (L-output current)

Each output tested individually per function table

Outputs loaded to UOL

2. IOH test (H-output current)

Each output tested individually per function table

Outputs loaded to UOH

3. IOS test (short-circuit current)

Each output tested individually per function table

Output shorted to GND

4. Is test (supply current)

All inputs open, outputs open

Measure total supply current

5. IIL test (L-input current)

Each input tested individually

Input at UIL, measure current

6. IIH test (H-input current)

Each input tested individually

Input at UIH, measure current

Ordering Designation

Integrated Circuit D 345 D

Manufacturer Information

VEB Halbleiterwerk Frankfurt/Oder

Plant in VEB Kombinat Mikroelektronik

DDR 1200 Frankfurt/Oder - Telephone 4 60

elektronik export-import

People-owned Foreign Trade Enterprise of the German Democratic Republic

DDR - 1026 Berlin, Alexanderplatz 6

House of the Electrical Industry

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