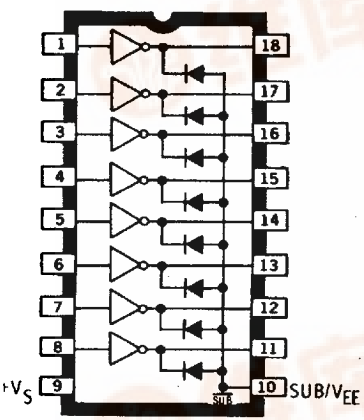
SERIES 2580

29316A

8-CHANNEL SOURCE DRIVERS

UDN2580/85LW

UDN2580/85A



Dwg. No. A-11,359

Note that the UDN2580/85A (dual in-line packages) and UDN2580/85LW (small-outline IC packages) are electrically identical and share a common pin number assignment.

This versatile family of integrated circuits will work with many combinations of logic- and load-voltage levels, meeting interface requirements beyond the capabilities of standard logic buffers. Series UDN2580A/LW source drivers can drive incandescent, LED, or vacuum fluorescent displays. Internal transient-suppression diodes permit the drivers to be used with inductive loads such as relays, solenoids, dc and stepping motors, and magnetic print hammers.

The Type UDN2580A and UDN2580LW are high-current source drivers used to switch the ground ends of loads that are directly connected to a -50 V supply. Typical loads are telephone relays, PIN diodes, and LEDs.

The UDN2585A and UDN2585LW are drivers designed for applications requiring low output saturation voltages. Typical loads are low-voltage LEDs and incandescent displays. The eight non-Darlington, 25 V outputs will simultaneously sustain continuous load currents of -120 mA at ambient temperatures to +70°C.

The UDN2588A has separate logic and driver supply lines. Its eight drivers can serve as an interface between positive logic (TTL, CMOS, PMOS) or negative logic (NMOS) and either negative or split-load supplies to -45 V. Selected devices (UDN2588A-1) may be operated to -65 V.

These drivers are packaged in plastic DIPs (suffix A) or surface-mountable wide-body SOICs (suffix LW), and are rated for operation over the temperature range of -20°C to +85°C.

FEATURES

- TTL, CMOS, PMOS, NMOS Compatible
- High Output Current Rating
- Internal Transient Suppression
- Efficient Input/Output Structure

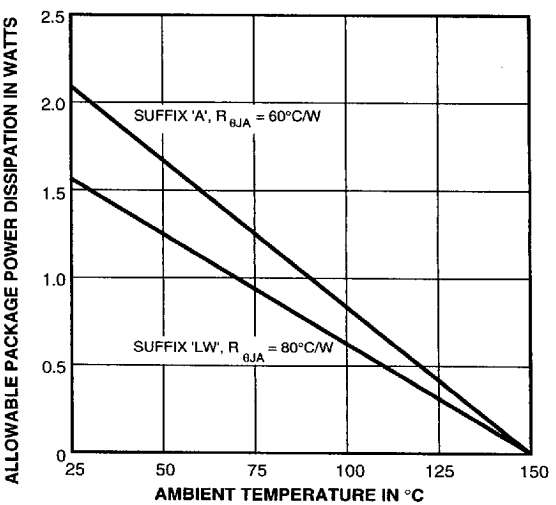
Always order by complete part number, e.g., **UDN2580A**.

ABSOLUTE MAXIMUM RATINGS

at 25°C Free-Air Temperature for any one driver (unless otherwise noted).

	UDN2580A/LW	UDN2585A/LW	UDN2588A	UDN2588A-1
Output Voltage, V_{CE}	50 V	25 V	50 V	80 V
Supply Voltage, V_S (ref. sub.)	50 V	25 V	50 V	80 V
Supply Voltage, V_{CC} (ref. sub.)	—	—	50 V	80 V
Input Voltage, V_{IN} (ref. V_S)	-30 V	-20 V	-30 V	-30 V
Total Output Current, ($I_C + I_S$)	-500 mA	-250 mA	-500 mA	-500 mA
Substrate Current I_{SUB}	3.0 A	2.0 A	3.0 A	3.0 A

Package Power Dissipation, P_D (single output) ..... **1.0 W**
(total package) ..... **See Graph**
Operating Temperature Range, T_A ..... **-20°C to +85°C**
Storage Temperature Range, T_S ..... **-55°C to +150°C**



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For simplification, these devices are characterized on the following pages with specific voltages for inputs, logic supply (V_S), load supply (V_{EE}), and collector supply (V_{CC}). Typical use of the UDN2580A/LW is with negative referenced logic. The more common application of the UDN2585A/LW, UDN2588A, and UDN2588A-1 is with positive referenced logic supplies. In application, the devices are capable of operation over a wide range of logic and supply voltage levels:

TYPICAL OPERATING VOLTAGES

V_S	$V_{IN(ON)}$	$V_{IN(OFF)}$	V_{CC}	$V_{EE(MAX)}$	Device Type
0 V	-15 V to -3.6 V	-0.5 V to 0 V	NA	-25 V	UDN2585A/LW
				-50 V	UDN2580A/LW
+5 V	0 V to +1.4 V	+4.5 V to +5 V	NA	-20 V	UDN2585A/LW
				-45 V	UDN2580A/LW
			≤ 5 V	-45 V	UDN2588A
				-75 V	UDN2588A-1
+12 V	0 V to +8.4 V	+11.5 V to +12 V	NA	-13 V	UDN2585A/LW
				-38 V	UDN2580A/LW
			≤12 V	-38 V	UDN2588A
				-68 V	UDN2588A-1
+15 V	0 V to +11.4 V	+14.5 V to +15 V	NA	-10V	UDN2585A/LW
				-35 V	UDN2580A/LW
			≤15 V	-35 V	UDN2588A
				-65 V	UDN2588A-1

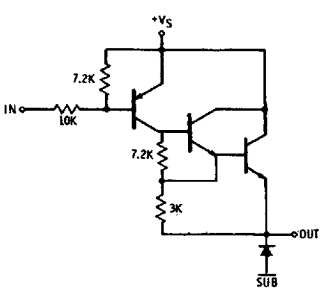
NOTE: The substrate must be tied to the most negative point in the external circuit to maintain isolation between drivers and to provide for normal circuit operation.

UDN2580A and UDN2580LW
ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_S = 0 V, V_{EE} = -45 V (unless otherwise noted).

Characteristic	Symbol	Test Conditions	Limits		
			Min.	Max.	Units
Output Leakage Current	I_{CEX}	V_{IN} = -0.5 V, V_{OUT} = V_{EE} = -50 V	—	50	µA
		V_{IN} = -0.4 V, V_{OUT} = V_{EE} = -50 V, T_A = 70°C	—	100	µA
Output Sustaining Voltage	$V_{CE(SUS)}$	V_{IN} = -0.4 V, I_{OUT} = -25 mA, Note 1	35	—	V
Output Saturation	$V_{CE(SAT)}$	V_{IN} = -2.4 V, I_{OUT} = -100 mA	—	1.8	V
		V_{IN} = -3.0 V, I_{OUT} = -225 mA	—	1.9	V
		V_{IN} = -3.6 V, I_{OUT} = -350 mA	—	2.0	V
Input Current	$I_{IN(ON)}$	V_{IN} = -3.6 V, I_{OUT} = -350 mA	—	-500	µA
		V_{IN} = -15 V, I_{OUT} = -350 mA	—	-2.1	mA
	$I_{IN(OFF)}$	I_{OUT} = -500 µA, T_A = 70°C, Note 3	-50	—	µA
Input Voltage	$V_{IN(ON)}$	I_{OUT} = -100 mA, V_{CE} ≤1.8 V, Note 4	—	-2.4	V
		I_{OUT} = -225 mA, V_{CE} ≤1.9 V, Note 4	—	-3.0	V
		I_{OUT} = -350 mA, V_{CE} ≤2.0 V, Note 4	—	-3.6	V
	$V_{IN(OFF)}$	I_{OUT} = -500 µA, T_A = 70°C	-0.2	—	V
Clamp Diode Leakage Current	I_R	V_R = 50 V, T_A = 70°C	—	50	µA
Clamp Diode Forward Voltage	V_F	I_F = 350 mA	—	2.0	V
Input Capacitance	C_{IN}		—	25	pF
Turn-On Delay	t_{PHL}	0.5 E_{IN} to 0.5 E_{OUT}	—	5.0	µs
Turn-Off Delay	t_{PLH}	0.5 E_{IN} to 0.5 E_{OUT}	—	5.0	µs

NOTES:
1. Pulsed test, $t_p \leq 300$ µs, duty cycle ≤ 2%.
2. Negative current is defined as coming out of the specified device pin.
3. The $I_{IN(OFF)}$ current limit guarantees against partial turn-on of the output.
4. The $V_{IN(ON)}$ voltage limit guarantees a minimum output source current per the specified conditions.
5. The substrate must always be tied to the most negative point and must be at least 4.0 V below V_S.

PARTIAL SCHEMATIC



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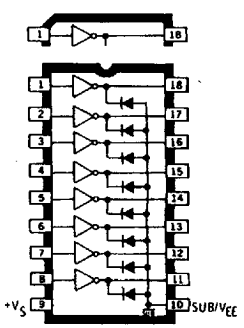

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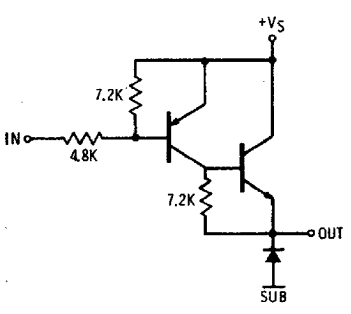
SERIES 2580
8-CHANNEL SOURCE DRIVERS

UDN2585A AND UDN2585LW
ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_S = 0 V, V_{EE} = -20 V (unless otherwise noted).

Characteristic	Symbol	Test Conditions	Limits		
			Min.	Max.	Units
Output Leakage Current	I_{CEX}	V_{IN} = -0.5 V, V_{OUT} = V_{EE} = -25 V	—	50	µA
		V_{IN} = -0.4 V, V_{OUT} = V_{EE} = -25 V, T_A = 70°C	—	100	µA
Output Sustaining Voltage	$V_{CE(SUS)}$	V_{IN} = -0.4 V, I_{OUT} = -25 mA, Note 1	15	—	V
Output Saturation Voltage	$V_{CE(SAT)}$	V_{IN} = -4.6 V, I_{OUT} = -60 mA	—	1.1	V
		V_{IN} = -4.6 V, I_{OUT} = -120 mA	—	1.2	V
Input Current	$I_{IN(ON)}$	V_{IN} = -4.6 V, I_{OUT} = -120 mA	—	-1.6	mA
		V_{IN} = -14.6 V, I_{OUT} = -120 mA	—	-5.0	mA
Input Voltage	$V_{IN(ON)}$	I_{OUT} = -120 mA, V_{CE} ≤1.2 V, Note 3	—	-4.6	V
	$V_{IN(OFF)}$	I_{OUT} = -100 µA, T_A = 70°C	-0.4	—	V
Clamp Diode Leakage Current	I_R	V_R = 25 V, T_A = 70°C	—	50	µA
Clamp Diode Forward Voltage	V_F	I_F = 120 mA	—	2.0	V
Input Capacitance	C_{IN}		—	25	pF
Turn-On Delay	t_{PHL}	0.5 E_{IN} to 0.5 E_{OUT}	—	5.0	µs
Turn-Off Delay	t_{PLH}	0.5 E_{IN} to 0.5 E_{OUT}	—	5.0	µs

NOTES: 1. Pulsed test, t_p ≤ 300 µs, duty cycle ≤ 2%.
2. Negative current is defined as coming out of the specified device pin.
3. The $V_{IN(ON)}$ voltage limit guarantees a minimum output source current per the specified conditions.
4. The substrate must always be tied to the most negative point and must be at least 4.0 V below V_S.

PARTIAL SCHEMATIC



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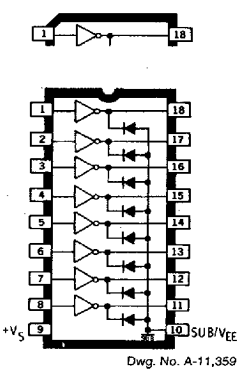

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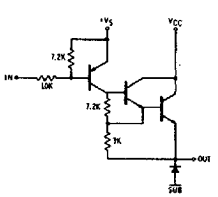
UDN2588A AND UDN2588A-1
ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_S = 5.0 V, V_{CC} = 5.0 V, V_{EE} = -40 V (unless otherwise noted).

Characteristic	Symbol	Applicable Devices	Test Conditions	Limits Min.	Limits Max.	Units
Output Leakage Current	I_{CEX}	UDN2588A	$V_{IN} \geq 4.5$ V, $V_{OUT} = V_{EE} = -45$ V	—	50	µA
			$V_{IN} \geq 4.6$ V, $V_{OUT} = V_{EE} = -45$ V, $T_A = 70°C$	—	100	µA
		UDN2588A-1	$V_{IN} \geq 4.5$ V, $V_{OUT} = V_{EE} = -75$ V	—	50	µA
			$V_{IN} \geq 4.6$ V, $V_{OUT} = V_{EE} = -75$ V, $T_A = 70°C$	—	100	µA
Output Sustaining Voltage	$V_{CE(SUS)}$	UDN2588A	$V_{IN} \geq 4.6$ V, $I_{OUT} = -25$ mA, Note 1	35	—	V
		UDN2588A-1	$V_{IN} \geq 4.6$ V, $V_{EE} = -70$ V, $I_{OUT} = -25$ mA, Note 1	50	—	V
Output Saturation Voltage	$V_{CE(SAT)}$	Both	$V_{IN} = 2.6$ V, $I_{OUT} = -100$ mA, Ref. V_{CC}	—	1.8	V
			$V_{IN} = 2.0$ V, $I_{OUT} = -225$ mA, Ref. V_{CC}	—	1.9	V
			$V_{IN} = 1.4$ V, $I_{OUT} = -350$ mA, Ref. V_{CC}	—	2.0	V
Input Current	$I_{IN(ON)}$	Both	$V_{IN} = 1.4$ V, $I_{OUT} = -350$ mA	—	-500	µA
			$V_S = 15$ V, $V_{EE} = -30$ V, $V_{IN} = 0$ V, $I_{OUT} = -350$ mA	—	-2.1	mA
	$I_{IN(OFF)}$	Both	$I_{OUT} = -500$ µA, $T_A = 70°C$, Note 3	-50	—	µA
Input Voltage	$V_{IN(ON)}$	Both	$I_{OUT} = -100$ mA, $V_{CE} \leq 1.8$ V, Note 4	—	2.6	V
			$I_{OUT} = -225$ mA, $V_{CE} \leq 1.9$ V, Note 4	—	2.0	V
			$I_{OUT} = -350$ mA, $V_{CE} \leq 2.0$ V, Note 4	—	1.4	V
	$V_{IN(OFF)}$	Both	$I_{OUT} = -500$ µA, $T_A = 70°C$	4.8	—	V
Clamp Diode Leakage Current	I_R	UDN2588A	$V_R = 50$ V, $T_A = 70°C$	—	50	µA
		UDN2588A-1	$V_R = 80$ V, $T_A = 70°C$	—	50	µA
Clamp Diode Forward Voltage	V_F	Both	$I_F = 350$ mA	—	2.0	V
Input Capacitance	C_{IN}	Both		—	25	pF
Turn-On Delay	t_{PLH}	Both	0.5 E_{IN} to 0.5 E_{OUT}	—	5.0	µs
Turn-Off Delay	t_{PLH}	Both	0.5 E_{IN} to 0.5 E_{OUT}	—	5.0	µs

NOTES:
1. Pulsed test, $t_p \leq 300$ µs, duty cycle ≤ 2%.
2. Negative current is defined as coming out of the specified device pin.
3. The $I_{IN(OFF)}$ current limit guarantees against partial turn-on of the output.
4. The $V_{IN(ON)}$ voltage limit guarantees a minimum output source current per the specified conditions.
5. The substrate must always be tied to the most negative point and must be at least 4.0 V below V_S.
6. V_{CC} must be equal to or less positive than V_S.

PARTIAL SCHEMATIC



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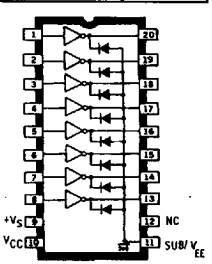
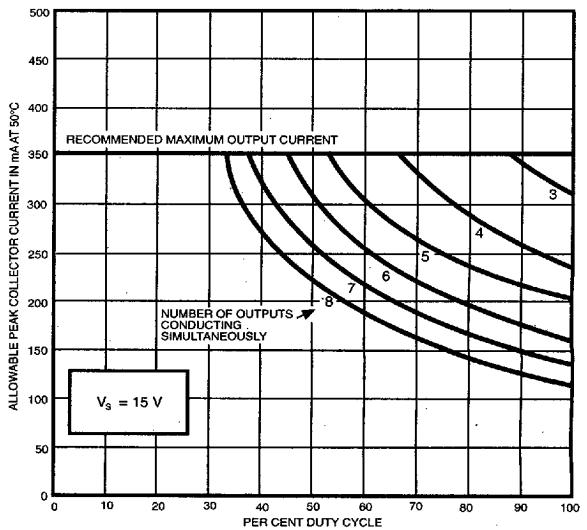


Dwg. No. A-11,357

ALLOWABLE PEAK COLLECTOR CURRENT AT 50°C AS A FUNCTION OF DUTY CYCLE



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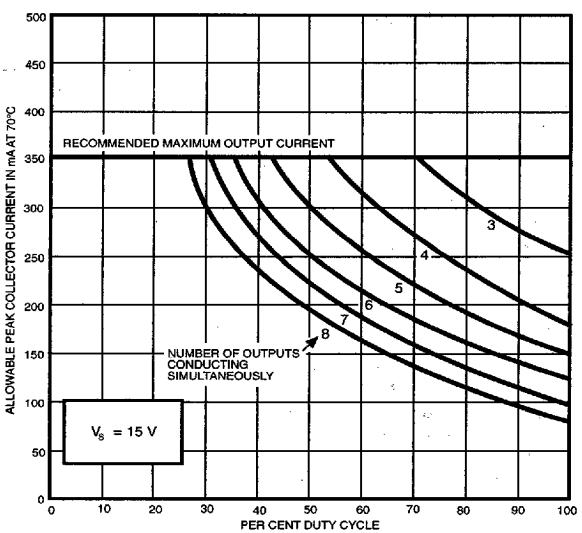
ALLOWABLE PEAK COLLECTOR CURRENT AT 70°C AS A FUNCTION OF DUTY CYCLE



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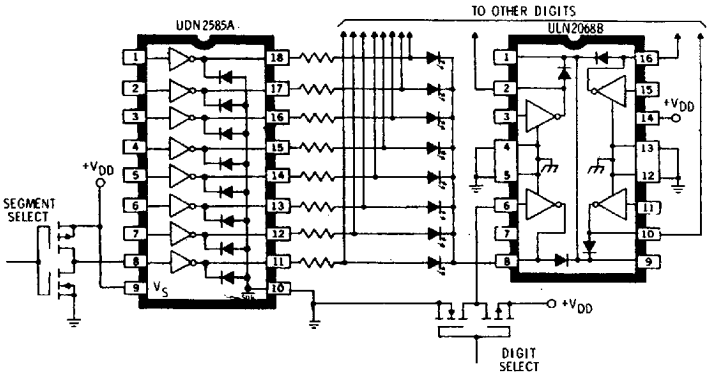
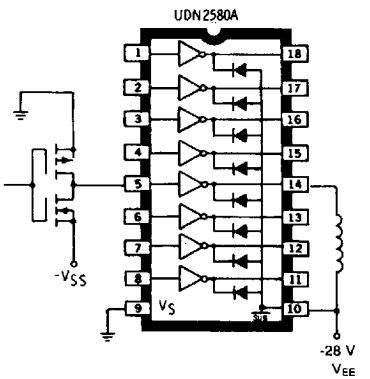
TYPICAL APPLICATIONS



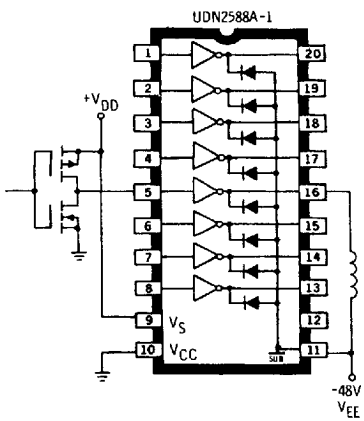
Dwg. No. B-1458A

COMMON-CATHODE LED DRIVER



Dwg. No. A-11,356

TELECOMMUNICATIONS RELAY DRIVER
(Negative Logic)



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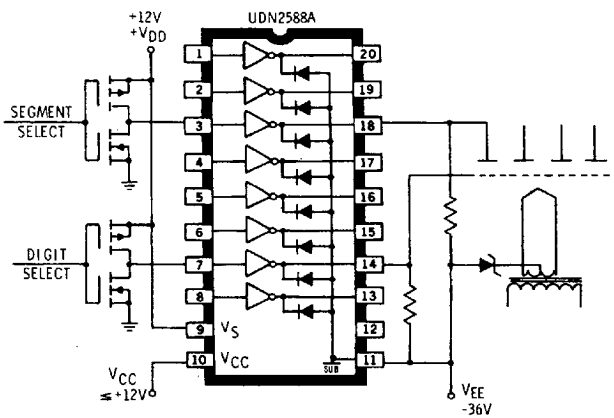
TELECOMMUNICATIONS RELAY DRIVER
(Positive Logic)



Dwg. No. A-11,363

VACUUM-FLUORESCENT DISPLAY DRIVER
(Split Supply)