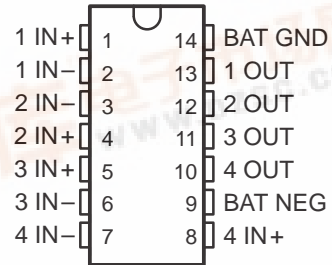


QUAD TELEPHONE RELAY DRIVER

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- Designed for –52-V Battery Operation
- 50-mA Output Current Capability
- Input Compatible With TTL and CMOS
- High Common-Mode Input Voltage Range
- Very Low Input Current
- Fail-Safe Disconnect Feature
- Built-in Output Clamp Diode
- Direct Replacement for National DS3680 and Fairchild μ A3680

D OR N PACKAGE
(TOP VIEW)

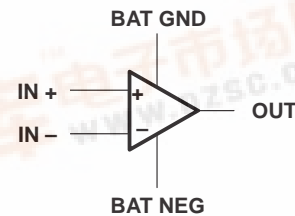


description

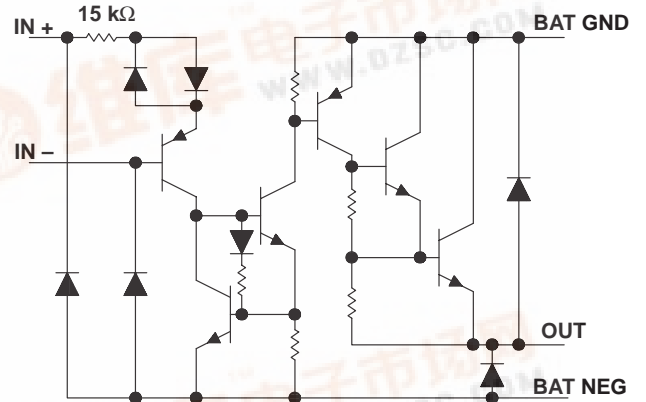
The DS3680 telephone relay driver is a monolithic integrated circuit designed to interface –48-V relay systems to TTL or other systems in telephone applications. It is capable of sourcing up to 50 mA from standard –52-V battery power. To reduce the effects of noise and IR drop between logic ground and battery ground, these drivers are designed to operate with a common-mode input range of ± 20 V referenced to battery ground. The common-mode input voltages for the four drivers can be different, so a wide range of input elements can be accommodated. The high-impedance inputs are compatible with positive TTL and CMOS levels or negative logic levels. A clamp network is included in the driver outputs to limit high-voltage transients generated by the relay coil during switching. The complementary inputs ensure that the driver output is off as a fail-safe condition when either output is open.

The DS3680 is characterized for operation from 0°C to 70°C.

symbol (each driver)



schematic diagram (each driver)



All resistor values shown are nominal.



DS3680

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage range at BAT NEG, V_{BAT-} (see Note 1)	–70 V to 0.5 V
Input voltage range with respect to BAT GND	–70 V to 20 V
Input voltage range with respect to BAT NEG	–0.5 V to 70 V
Differential input voltage, V_{ID} (see Note 2)	± 20 V
Output current, I_O : Resistive load	–100 mA
Inductive load	–50 mA
Inductive output load	5 H
Continuous total dissipation	See Dissipation Rating Table
Operating free-air temperature range, T_A	0°C to 70°C
Storage temperature range, T_{stg}	–65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	260°C

- NOTES: 1. All voltages are with respect to BAT GND, unless otherwise specified.
 2. Differential input voltages are at the noninverting input terminal IN+ with respect to the inverting input terminal IN–.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING
D	950 mW	7.6 mW/°C	608 mW
N	1150 mW	9.2 mW/°C	736 mW

recommended operating conditions

	MIN	MAX	UNIT
Supply voltage, V_{BAT-}	–10	–60	V
Input voltage, either input	–20†	20	V
High-level differential input voltage, V_{IDH}	2	20	V
Low-level differential input voltage, V_{IDL}	–20†	0.8	V
Operating free-air temperature, T_A	0	70	°C

† The algebraic convention, in which the less positive (more negative) limit is designated minimum, is used in this data sheet for input voltage levels.

electrical characteristics over recommended operating free-air temperature range, $V_{BAT-} = -52$ V (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP‡	MAX	UNIT
I_{IH} High-level input current (into IN+)	$V_{ID} = 2$ V		40	100	μA
	$V_{ID} = 7$ V		375	1000	
I_{IL} Low-level input current (into IN+)	$V_{ID} = 0.4$ V		0.01	5	μA
	$V_{ID} = -7$ V		–1	–100	
$V_{O(on)}$ On-stage output voltage	$I_O = 50$ mA, $V_{ID} = 2$ V	–1.6		–2.1	V
$I_{O(off)}$ Off-stage output current	$V_O = V_{BAT-}$ Inputs open		–2	–100	μA
			–2	–100	
I_R Clamp diode reverse current	$V_O = 0$		2	100	μA
V_{OK} Output clamp voltage	$I_O = 50$ mA		0.9	1.2	V
	$I_O = -50$ mA, $V_{BAT-} = 0$		–0.9	–1.2	
$I_{BAT(on)}$ On-state battery current	All drivers on		–2	–4.4	mA
$I_{BAT(off)}$ Off-state battery current	All drivers off		–1	–100	μA

‡ All typical values are at $T_A = 25^\circ\text{C}$.

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switching characteristics $V_{BAT-} = -52\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{on}	Turn-on time	$V_{ID} = 3\text{-V pulse}$, $R_L = 1\text{ k}\Omega$, $L = 1\text{ H}$, See Figure 2		1	10	μs
t_{off}	Turn-off time			1	10	μs

PARAMETER MEASUREMENT INFORMATION

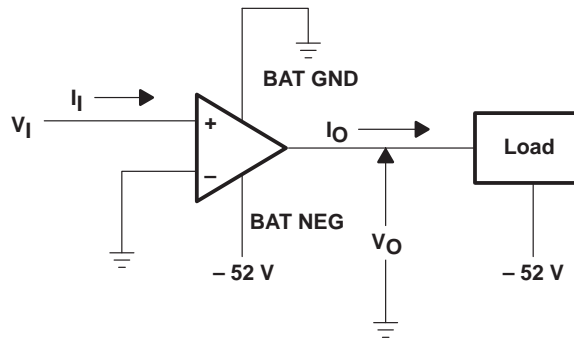


Figure 1. Generalized Test Circuit, Each Driver

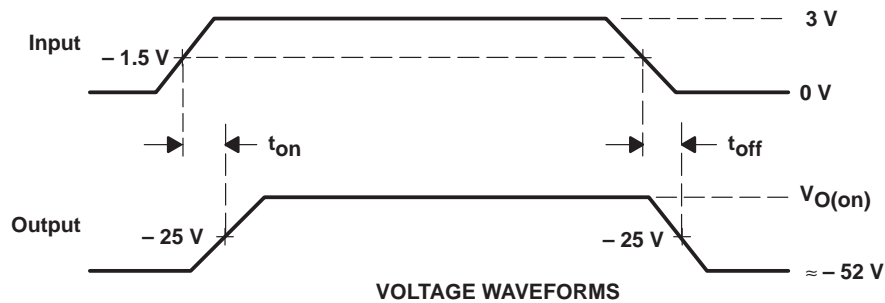
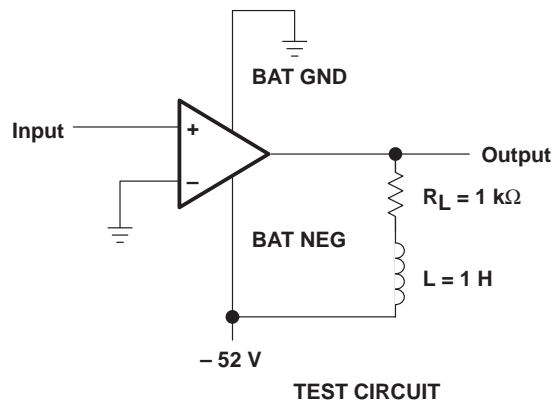


Figure 2. Test Circuit and Voltage Waveforms, Each Driver

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APPLICATION INFORMATION

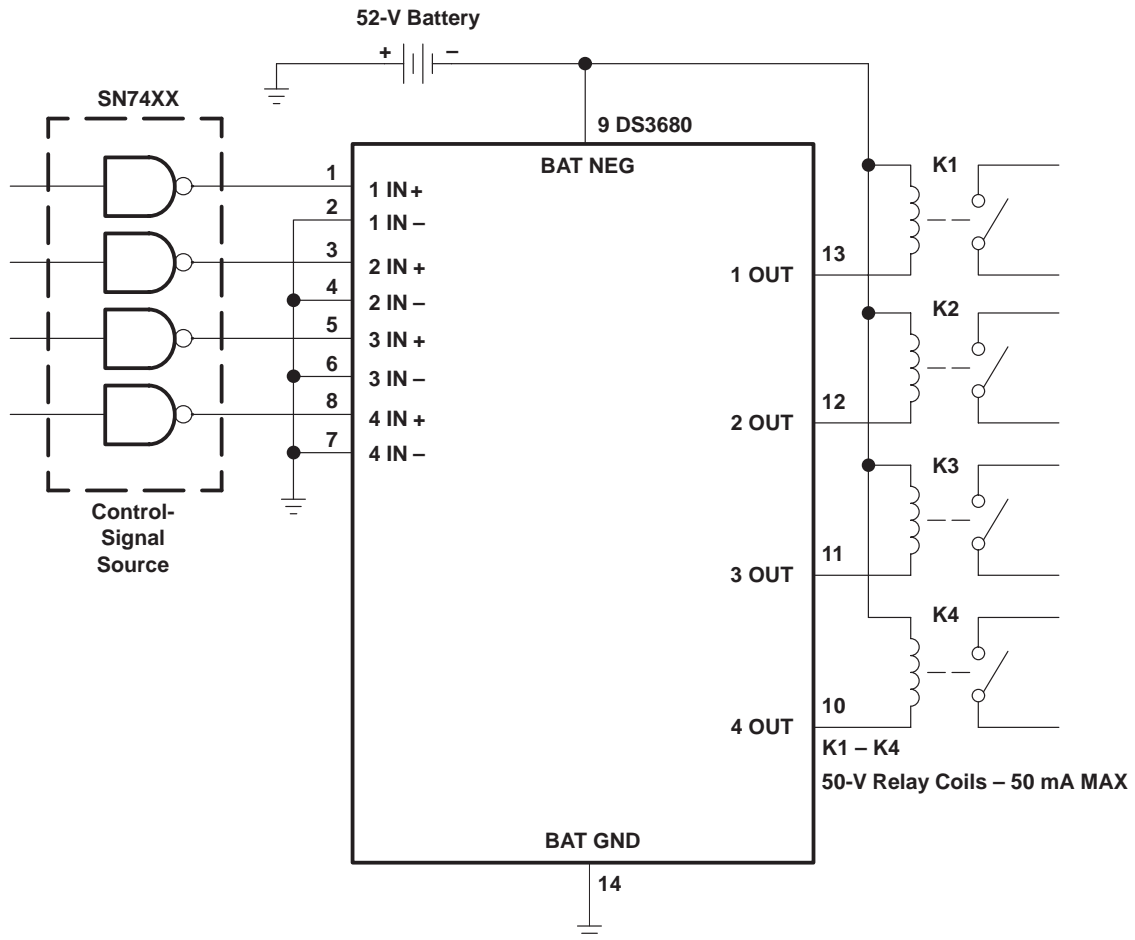


Figure 3. Relay Driver

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