

4825898 INTEGRATED POWER

82D 00273 D

T-43-25

INTEGRATED POWER SEMICONDUCTORS, LTD.

1.25 Amp Quad Darlington Arrays

Description

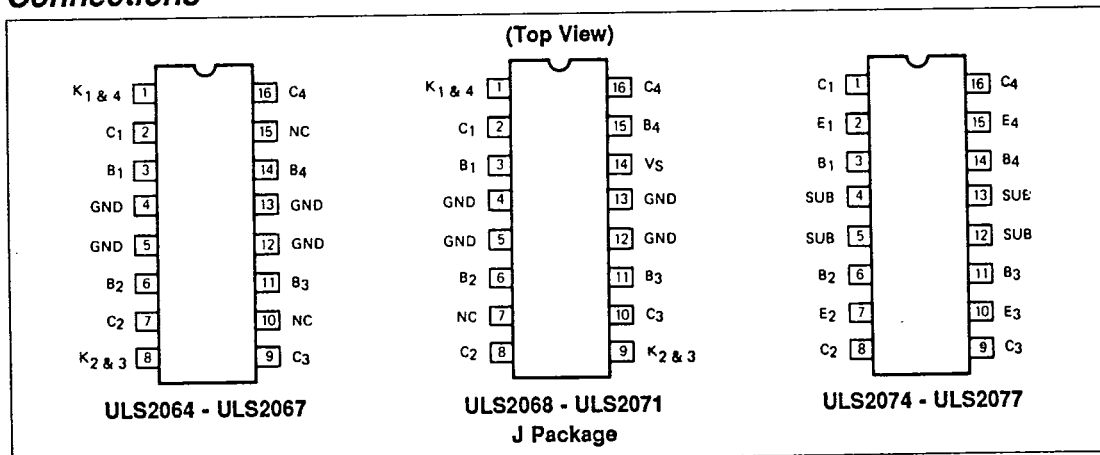
Intended for military, aerospace and related applications, the ULS2064 through ULS2077 are high voltage, high current monolithic bipolar integrated circuits especially designed for interfacing low-level control logic and peripheral loads such as relays, solenoids, DC and stepping motors, multiplexed LED and incandescent displays and heaters. The devices are specified with a minimum output breakdown of 50 volts, and $V_{CE(SUS)}$ minimum of 35V measured at 100mA, or a minimum output breakdown of 80V, $V_{CE(SUS)}$ minimum of 50V, and an output current specification of 1.25A. The logic inputs are designed to be compatible with TTL, DTL, LSTTL, CMOS, NMOS and PMOS logic families. The ULS2064-71 include internal clamp diodes for driving inductive loads. All twelve quad darlington arrays are supplied in 16-pin hermetic DIP packages which meet the processing and environmental requirements of MIL-STD-883 methods 5004 and 5005, and the dimensional requirements of MIL-M-38510.

Features

- Four power drivers per package
- 1.5 amp collector currents
- 80 and 50 volt BV_{CEX} ratings
- Internal clamp diodes for inductive loads
- Hermetically sealed package to MIL M-38510
- High-reliability screening to MIL STD-883, class B
- Compatibility with all popular logic families
- Low internal parasitics

Section 4 - Power Drivers
ULS2064 through ULS2077

Connections



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82D 00274 D

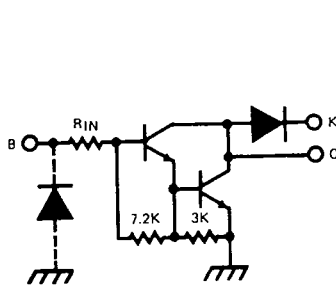
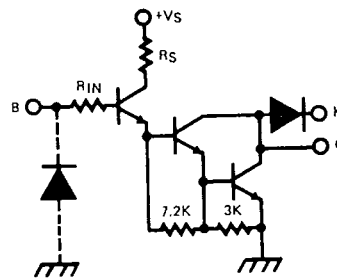
T-43-25

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Input Voltage (Note 2)	See Selection Guide	Output Sustaining Voltage	See Selection Guide
Input Current (Note 3)	25mA	Power Dissipation, P_D	2.2W
Supply Voltage		Operating Junction Temperature, T_J	+150°C
ULS2068, ULS2069	10V	Oper. Ambient Temp. Range, T_A	-55°C to +125°C
ULS2070, ULS2071	20V	Storage Temp. Range, T_S	-65°C to +150°C
Output Voltage	See Selection Guide	Thermal Resistance: junction to ambient	
Output Current (Note 1)	1.5A	L Package	90°C/W
		J Package	75°C/W

Absolute maximum ratings are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the device should be operated at these limits. The electrical characteristics provide conditions for actual device operation.

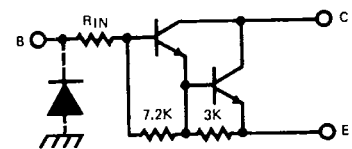
- Note 1. Allowable combinations of output current, number of outputs conducting, and duty cycle are shown on following pages.
 Note 2. Input voltage is referenced to the substrate (no connection to other pins) for type ULS2074/75/76/77; reference is ground for all other types.
 Note 3. Input current may be limited by maximum allowable input voltages.

Schematic Diagram (Single Darlington Shown)ULS2064/2065: $R_{IN} = 350\Omega$ ULS2066/2067: $R_{IN} = 3K\Omega$ 

ULS2068/2069:

 $R_{IN} = 2.5K\Omega$, $R_S = 900\Omega$

ULS2070/2071:

 $R_{IN} = 11.6K\Omega$, $R_S = 3.4K\Omega$ ULS2074/2075: $R_{IN} = 350\Omega$ ULS2076/2077: $R_{IN} = 3K\Omega$

4825898 INTEGRATED POWER

82D 00275 D

T-43-25

Electrical Characteristics

Parameter	Conditions	Devices	Temp	ULS2064/2067		Units
				Min	Max	
Output Leakage Current, I_{CEX}	$V_{CE} = 50V$	2064/66	•		500	μA
	$V_{CE} = 80V$	2065/67	•		500	μA
Output Sustaining Voltage, $V_{CE} (SUS)$	$I_C = 100mA, V_{IN} = 0.4V$	2064/66	•	35		V
	$I_C = 100mA, V_{IN} = 0.4V$	2065/67	•	50		V
Collector-Emitter Saturation Voltage $V_{CE} (SAT)$	$I_C = 500mA, I_B = 1.1mA$	All	-55°C		1.35	V
	$I_C = 750mA, I_B = 1.7mA$				1.55	V
	$I_C = 1.0A, I_B = 2.25mA$				1.75	V
	$I_C = 1.25A, I_B = 3.75mA$				1.95	V
	$I_C = 500mA, I_B = 625\mu A$				1.20	V
	$I_C = 750mA, I_B = 935\mu A$				1.35	V
	$I_C = 1.0A, I_B = 1.25mA$				1.55	V
	$I_C = 1.25A, I_B = 2.0mA$				1.75	V
	$I_C = 500mA, I_B = 625\mu A$		+125°C		1.35	V
	$I_C = 750mA, I_B = 935\mu A$				1.55	V
	$I_C = 1.0A, I_B = 1.25mA$				1.75	V
	$I_C = 1.25A, I_B = 2.0mA$				1.95	V
Input Current, $I_{IN} (ON)$	$V_{IN} = 2.4V$	2064/65	•		4.3	mA
	$V_{IN} = 3.75V$		•		9.6	mA
	$V_{IN} = 5.0V$	2066/67	•		1.8	mA
	$V_{IN} = 12V$		•		5.2	mA
Input Voltage, $V_{IN} (ON)$	$V_{CE} = 2.0V, I_C = 1.0A$	2064/65	-55°C		3.1	V
	$V_{CE} = 2.0V, I_C = 1.0A$				2.0	V
	$V_{CE} = 2.0V, I_C = 1.0A$	2066/67	-55°C		11.5	V
	$V_{CE} = 2.0V, I_C = 1.0A$				6.5	V
Turn-on Delay, t_{PLH}	$0.5E_{IN}$ to $0.5E_{OUT}$	All	•		1.0	μS
Turn-off Delay, t_{PHL}	$0.5E_{IN}$ to $0.5E_{OUT}$		•		1.5	μS
Clamp Diode Leakage Current, I_R	$V_R = 50V$	2064/66	•		100	μA
	$V_R = 80V$	2065/67	•		100	μA
Clamp Diode Forward Voltage, V_F	$I_F = 1.25A$	All	•		2.1	V

The • denotes the specifications which apply over the full operating temperature range, all others apply at $T_A = 25^\circ C$ unless otherwise specified.

Section 4 - Power Drivers
ULS2064 through ULS2077

4825898 INTEGRATED POWER

82D 00276 D

T-43-25

Electrical Characteristics (Cont.)

VS = 5V for ULS2068/67, VS = 12V for ULS2070/71

Parameter	Conditions	Devices	Temp	2068-2071		Units
				Min	Max	
Output Leakage Current, I_{CEX}	$V_{CE} = 50V$	2068/70	•		500	μA
	$V_{CE} = 80V$	2069/71	•		500	μA
Output Sustaining Voltage, $V_{CE(SUS)}$	$I_C = 100mA, V_{IN} = 0.4V$	2068/70	•	35		V
	$I_C = 100mA, V_{IN} = 0.4V$	2069/71	•	50		V
Collector Emitter Saturation Voltage; $V_{CE(SAT)}$	$I_C = 500mA, V_{IN} = 3.2V$	2068/69	-55°C		1.35	V
	$I_C = 750mA, V_{IN} = 3.2V$				1.55	V
	$I_C = 1.0A, V_{IN} = 3.2V$				1.75	V
	$I_C = 1.25A, V_{IN} = 3.2V$				1.95	V
	$I_C = 500mA, V_{IN} = 2.9V$				1.20	V
	$I_C = 750mA, V_{IN} = 2.9V$				1.35	V
	$I_C = 1.0A, V_{IN} = 2.9V$				1.55	V
	$I_C = 1.25A, V_{IN} = 2.9V$				1.75	V
	$I_C = 500mA, V_{IN} = 2.8V$		+125°C		1.35	V
	$I_C = 750mA, V_{IN} = 2.8V$				1.55	V
	$I_C = 1.0A, V_{IN} = 2.8V$				1.75	V
	$I_C = 1.25A, V_{IN} = 2.8V$				1.95	V
	$I_C = 500mA, V_{IN} = 5.5V$	2070/71	-55°C		1.35	V
	$I_C = 750mA, V_{IN} = 5.5V$				1.55	V
	$I_C = 1.0A, V_{IN} = 5.5V$				1.75	V
	$I_C = 1.25A, V_{IN} = 5.5V$				1.95	V
	$I_C = 500mA, V_{IN} = 5.1V$				1.20	V
	$I_C = 750mA, V_{IN} = 5.1V$				1.35	V
	$I_C = 1.0A, V_{IN} = 5.1V$				1.55	V
	$I_C = 1.25A, V_{IN} = 5.1V$				1.75	V
	$I_C = 500mA, V_{IN} = 5.0V$		+125°C		1.35	V
	$I_C = 750mA, V_{IN} = 5.0V$				1.55	V
	$I_C = 1.0A, V_{IN} = 5.0V$				1.75	V
	$I_C = 1.25A, V_{IN} = 5.0V$				1.95	V
Input Current, $I_{IN(ON)}$	$V_{IN} = 3.2V$	2068/69	-55°C		600	μA
	$V_{IN} = 2.75V$				550	μA
	$V_{IN} = 2.75V$		+125°C		850	μA
	$V_{IN} = 3.75V$				1000	μA
	$V_{IN} = 5.0V$	2070/71	•		400	μA
	$V_{IN} = 12V$		•		1250	μA
Input Voltage, $V_{IN(ON)}$	$V_{CE} = 2.0V, I_C = 1.0A$	2068/69	-55°C		3.2	V
	$V_{CE} = 2.0V, I_C = 1.0A$				2.75	V
	$V_{CE} = 2.0V, I_C = 1.0A$	2070/71	-55°C		5.0	V
	$V_{CE} = 2.0V, I_C = 1.0A$				5.0	V
Supply Current, I_S	$I_C = 500mA, V_{IN} = 3.2$	2068/69	•		6.0	mA
	$I_C = 500mA, V_{IN} = 5.0$	2070/71	•		4.5	mA
Turn-on Delay, t_{ON}	$0.5E_{IN}$ to $0.5E_{OUT}$	All	•		1.0	μs
Turn-off Delay, t_{OFF}	$0.5E_{IN}$ to $0.5E_{OUT}$	All	•		1.5	μs
Clamp Diode Leakage Current, I_P	$V_R = 50V$	2068/70	•		100	μA
	$V_R = 80V$	2069/71	•		100	μA
Clamp Diode Forward Voltage, V_F	$I_F = 1.25A$	All	•		2.1	V

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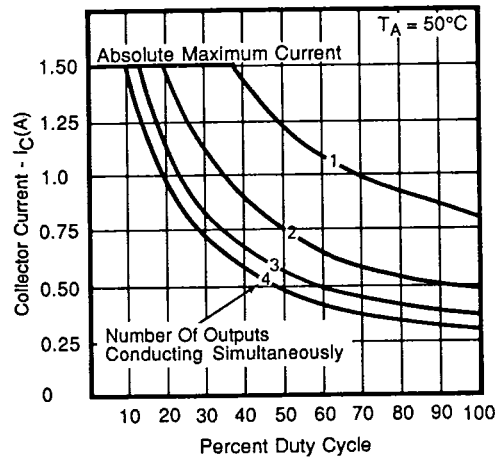
Electrical Characteristics (Cont.)

Parameters	Conditions	Devices	Temp	ULS2074/2077		Units
				Min	Max	
Output Leakage Current, I_{CEX}	$V_{CE} = 50V$	2074/76	•		500	μA
	$V_{CE} = 80V$	2075/77	•		500	μA
Output Sustaining Voltage, $V_{CE} (SUS)$	$I_C = 100mA, V_{IN} = 0.4V$	2074/76	•	35		V
	$I_C = 100mA, V_{IN} = 0.4V$	2075/77	•	50		V
Collector Emitter Saturation, $V_{CE(SAT)}$	$I_C = 500mA, I_B = 1.1mA$	All	-55°C		1.35	V
	$I_C = 750mA, I_B = 1.7mA$				1.55	V
	$I_C = 1.0A, I_B = 2.25mA$				1.75	V
	$I_C = 1.25A, I_B = 3.75mA$				1.95	V
	$I_C = 500mA, I_B = 625\mu A$		+125°C		1.20	V
	$I_C = 750mA, I_B = 935\mu A$				1.35	V
	$I_C = 1.0A, I_B = 1.25mA$				1.55	V
	$I_C = 1.25A, I_B = 2.0mA$				1.75	V
	$I_C = 500mA, I_B = 625\mu A$				1.35	V
	$I_C = 750mA, I_B = 935\mu A$				1.55	V
	$I_C = 1.0A, I_B = 1.25mA$				1.75	V
	$I_C = 1.25A, I_B = 2.0mA$				1.95	V
Input Current, $I_{IN} (ON)$	$V_{IN} = 2.4V$	2074/75	•		4.3	mA
	$V_{IN} = 3.75V$		•		9.6	mA
	$V_{IN} = 5.0V$	2076/77	•		1.8	mA
	$V_{IN} = 12V$		•		5.2	mA
Input Voltage, $V_{IN} (ON)$	$V_{CE} = 2.0V, I_C = 1.0A$	2074/75	-55°C		3.1	V
	$V_{CE} = 2.0V, I_C = 1.0A$				2.0	V
	$V_{CE} = 2.0V, I_C = 1.0A$	2076/77	-55°C		11.5	V
	$V_{CE} = 2.0V, I_C = 1.0A$				6.5	V
Turn-on Delay, t_{ON}	$0.5E_{IN}$ to $0.5E_{OUT}$	All	•		1.0	μs
Turn-off Delay, t_{OFF}	$0.5E_{IN}$ to $0.5E_{OUT}$	All	•		1.5	μs

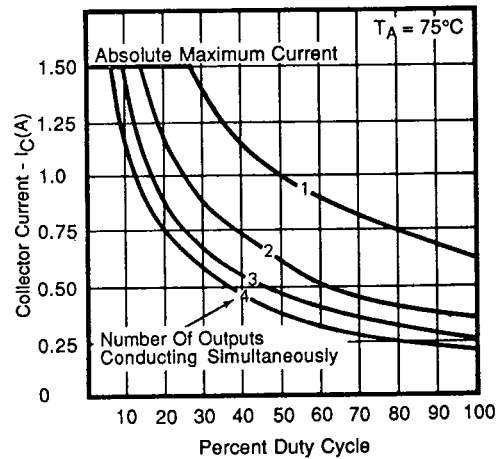
The • denotes the specifications which apply over the full operating temperature range, all others apply at $T_A = 25^\circ C$ unless otherwise specified.

Performance Characteristics

Peak Collector Current vs Duty Cycle



Peak Collector Current vs Duty Cycle

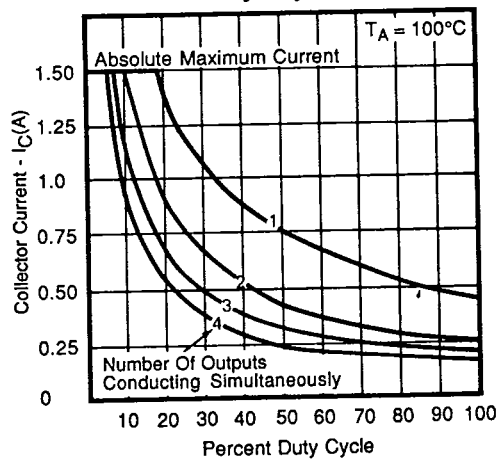
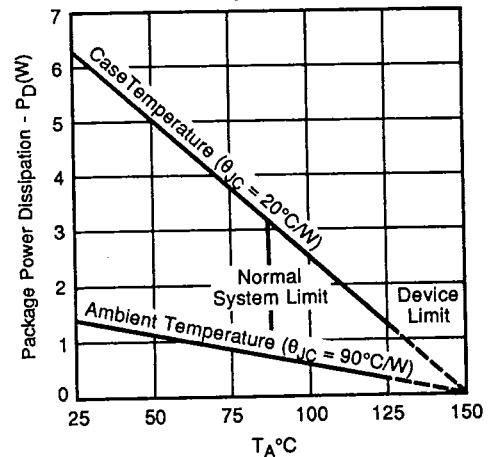


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82D 00278 D

T-43-25

Performance Characteristics, continued**Peak Collector Current vs Duty Cycle****Power Dissipation vs Temperature****Order Information**

Input Conditions	V_{IN} MAX	$V_{CE} = 50V$ $I_C = 1.5A$	$V_{CE} = 80$ $I_C = 1.5A$
TTL, DTL, Schottky TTL 5V CMOS and NMOS	15V	ULS2064J	ULS2065J
6 to 15V CMOS and PMOS	30V	ULS2066J	ULS2067J
TTL, DTL, Schottky TTL 5V CMOS and NMOS	15V	ULS2068J	ULS2069J
6 to 15V CMOS and PMOS	30V	ULS2070J	ULS2071J
General Purpose	30V	ULS2074J	—
General Purpose	60V	—	ULS2075J
6 to 15V CMOS and PMOS	30V	ULS2076J	—
6 to 15V CMOS and PMOS	60V	—	ULS2077J

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