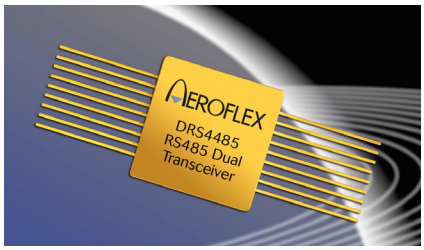
Standard Products *Datasheet*

DRS4485 Dual RS485 Interface Transceiver

Radiation Tolerant

www.aeroflex.com/RadHard

December 5, 2014



AEROFLEX
A passion for performance.

FEATURES

- Radiation Performance
  - Total dose ≥ 100 krad (Si)
- Designed for RS485 and RS422 Interface Applications
- Single +5V supply
- +5V to -7V Bus common mode range source output
- Driver maintains high impedance in three-state or with the power off
- Combined Impedance of a driver output and receiver allows up to 32 transceivers on the bus
- 200 mV typical input hysteresis
- Serial data rate 500KHz maximum
- Voltage source output
- Receiver output Hi for VIN Diff = 0V
- < 5ns skew between BUS and BUSN complementary outputs
- Monolithic construction
- Designed for commercial, industrial and aerospace applications
- Plainview is a Class H & K MIL-PRF-38534 manufacturer
- Packaging – Hermetic Flat Package
  - 18-lead, 0.63"sq x 0.125"Ht
  - Weight - 3.50 grams max

- **Aeroflex Plainview's Radiation Hardness Assurance Plan is DLA Certified to MIL-PRF-38534, Appendix G.**

GENERAL DESCRIPTION

The Aeroflex-Plainview DRS4485 is a monolithic dual bus/line transceiver designed for multi-point data transmission standard RS485 applications. The DRS4485 meets TIA/EIA -485 requirements. The receiver has a fail-safe feature which guarantees a high output state when the BUS is open or shorted.

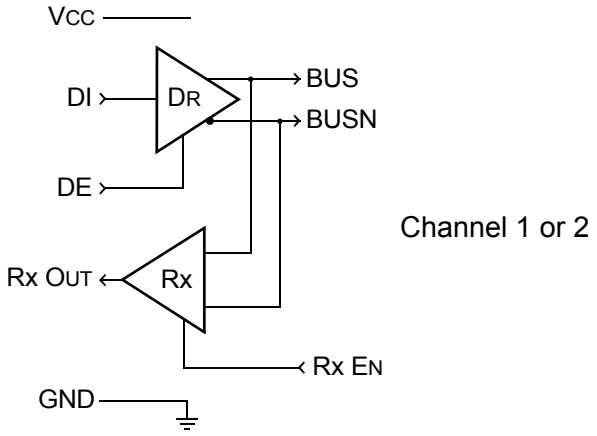


FIGURE 1 – SCHEMATIC

ABSOLUTE MAXIMUM RATINGS

Parameter	Range
Operating Case Temperature	-55°C to +125°C
Storage Case Temperature	-65°C to +150°C
Power Supply Voltages (V_{CC})	+12V_{DC}
Control Input Voltage	-0.5 V_{DC} to Vcc + 0.5V_{DC}
Driver Input Voltage	-0.5 V_{DC} to Vcc + 0.5V_{DC}
Driver Output Voltage	±5V
Receiver Input Voltage	±5V
Receiver Output Voltages	-0.5 V_{DC} to Vcc + 0.5V_{DC}

NOTICE: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress rating only; functional operation beyond the "Operation Conditions" is not recommended and extended exposure beyond the "Operation Conditions" may affect device reliability.

ELECTRICAL CHARACTERISTICS 2/ 4/

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Differential driver output voltage (unloaded)	I_O = 0	V_{OD1}	2.5	3.0	5	Vp-p
Differential driver output voltage (with load) 1/	See Figure 2	V_{OD2}	2.5	3.0	5	Vp-p
Change in magnitude of driver differential output Voltage for complementary states		ΔV_{OD}	-	-	0.2	Vp-p
Driver common mode output voltage		V_{OC}	-	2.55	3	V
Change in magnitude of driver common-mode output Voltage for complementary states		$\Delta\|V_{OC}$	-	-	0.2	V
Input high voltage	DE, DI, $\overline{RE}$	V_{IH}	2.4	-	-	V
Input low voltage		V_{IL}		-	0.8	V
Input current 1/		I_{IN}		±1	±2	µA
Differential input threshold voltage for receiver	-6.5V £ V_{CM} £ +5V	V_{TH}	-0.5	-0.2	-0.1	V
Receiver input hysteresis 3/	V_{CM} = 0	ΔV_{TH}	-	160	400	mV
Receiver output high voltage 1/	I_O = -0.4mA	V_{OH}	4.0	-	-	V
Receiver output low voltage 1/	I_O = 0.4mA	V_{OL}	-	-	0.5	V
Receiver input differential resistance 3/	-	RIN_{DIFF}	30K	-	-	Ω
Receiver input common-mode resistance 3/	-	RIN_{CM}	8K	-	-	Ω
Driver short-circuit current 1/	-	I_{OS}	50	80	140	mA
Receiver short-circuit current 1/	V_{OH} to GND or V_{OL} to Vcc	I_{OSR}	7	50	85	mA

STATIC DC POWER SUPPLY CURRENTS 2/

Input Conditions			Driver Output Conditions		Sym	Min	Typ	Max	Unit	Channel Conditions			
										Channel 1		Channel 2	
DE	DI	RE	Output State	Output Load						Driver	Receiver	Driver	Receiver
0V	X	5V	HiZ	X	I_{CC1} 1/	-	10	16	mA	Disabled	Disabled	Disabled	Disabled
5V	X	0V	LoZ	NL	I_{CC2} 1/	-	29	40	mA	Enabled	Enabled	Disabled	Disabled
5V	X	0V	LoZ	60 W	I_{CC3}	-	50	65	mA	Enabled	Enabled	Disabled	Disabled

DE=Driver En, DI=Driver In, RE=Receiver En X=HiLo. 0V=GND. 5V=V_{DC}. HiZ=high impedance. LoZ=low impedance. L=No Load

SWITCHING CHARACTERISTICS 4/

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Driver input to output delay	R_{DIFF} = 60W See test ckt Figure 2	t_{PLH}	-	125	200	nS
Driver input to output delay		t_{PHL}	-	80	150	nS
Driver output to output delay		t_{SKEW}	-	4	15	nS
Driver rise or fall time		t_r, t_f	-	100	150	nS
Driver Output enable delay		t_{ZH}	-	160	250	nS
Driver Output disable delay		t_{LZ}	-	220	350	nS
Receiver input to output delay	I_O = 0 See test ckt Figure 2 C_L = 15pF	t_{PLH}	-	80	150	nS
		t_{PHL}	-	90	150	nS
Receiver rise or fall time		t_r, t_f	-	26	50	nS
Receiver enable delay		t_{ZL}	-	90	150	nS
Receiver disable delay		t_{ZH}	-	120	150	nS

Notes:
1/ The active element that makes up the device has been tested to 200krad(Si) to assure RHA designator level "R" (100krad(Si)) of method 1019, Condition A of MIL-STD-883 at +25°C for these parameters. The element will be retested after design or process changes that can affect RHA response of this element. Post Radiation test limits for the input current (I_{IN}) test, is Max = ±3uA.
2/ Current measurements are for both channels.
3/ Not tested, guaranteed by design to the specified limits.
4/ Min/Max values are for V_{CC} = +5V ±5%, T_C = -55°C to +125°C. Typical values are measured at V_{CC} = +5V and T_C = +25°C.

DRIVER FUNCTION TABLE

Inputs		Outputs	
DI	DE	BUS	BUSN
H	H/OPEN	H	L
L	H/OPEN	L	H
X	L	OFF HiZ	OFF HiZ

RECEIVER FUNCTION TABLE

DIFF Input	RE	Output
> -100mV	L	H
< -500mV	L	L
X	H/OPEN	H
OPEN	X	H
SHORT	X	H

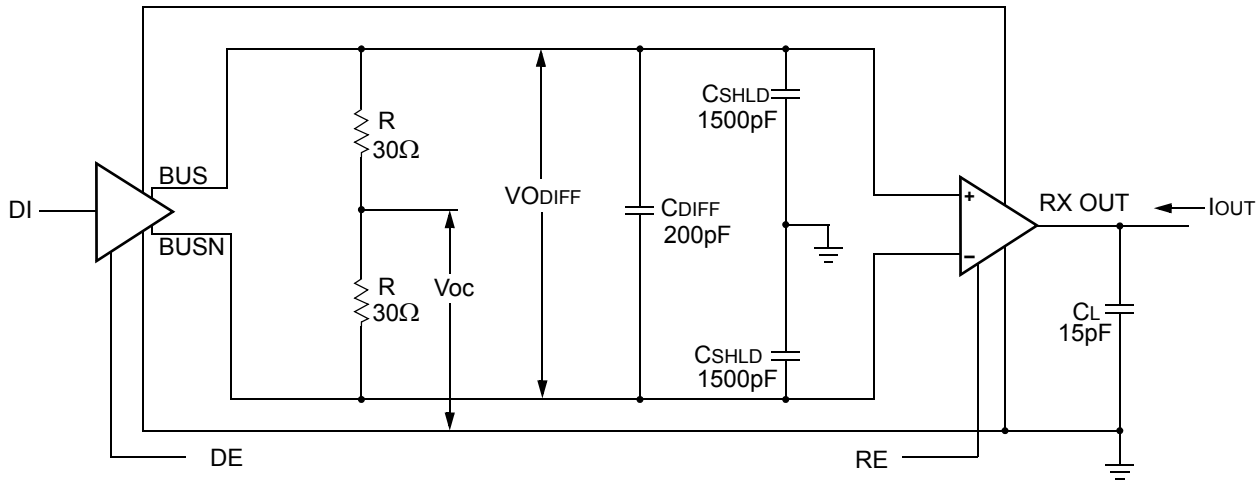


FIGURE 2 – DRIVER/RECEIVER TIMING TEST CIRCUIT (Channel 1 or 2)

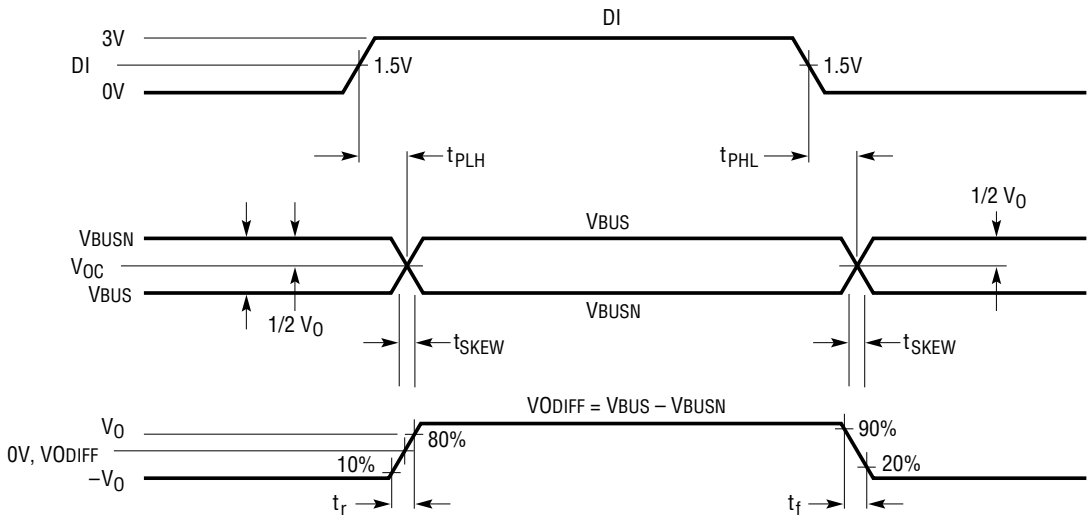


FIGURE 3 – DRIVER SWITCHING WAVEFORMS

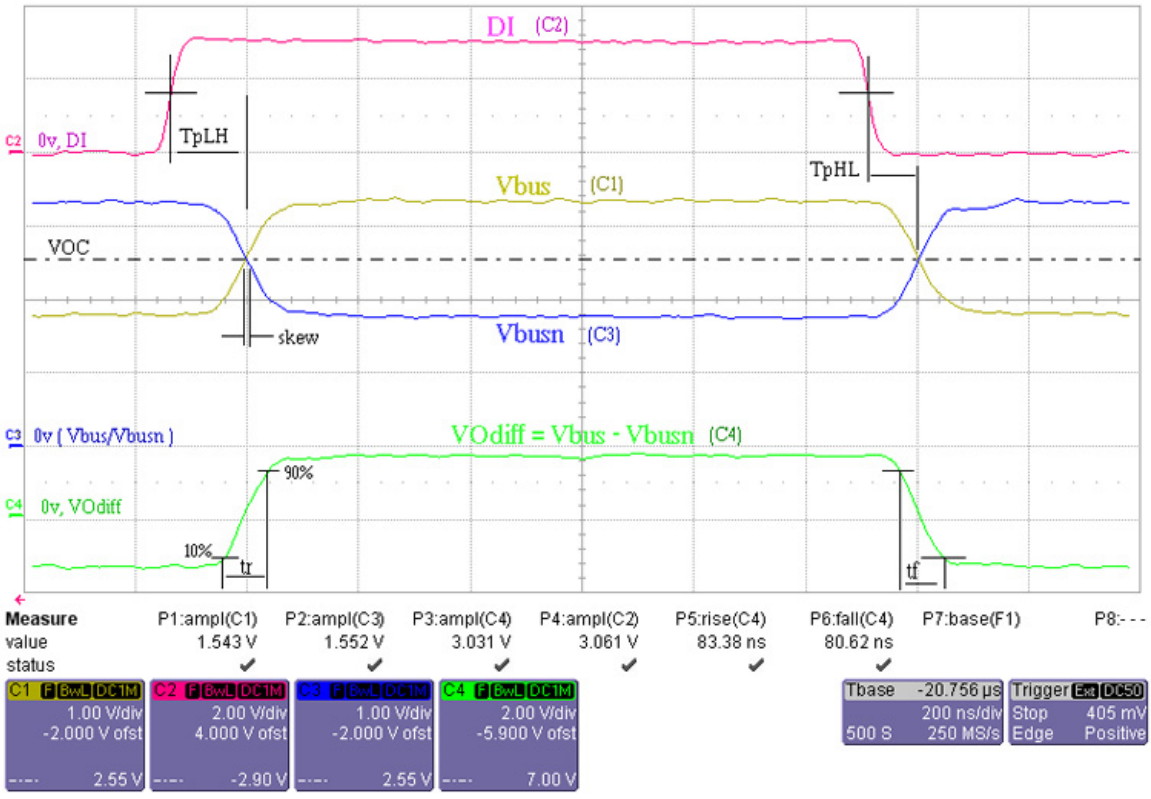


FIGURE 3A – TYPICAL DRIVER OUTPUTS

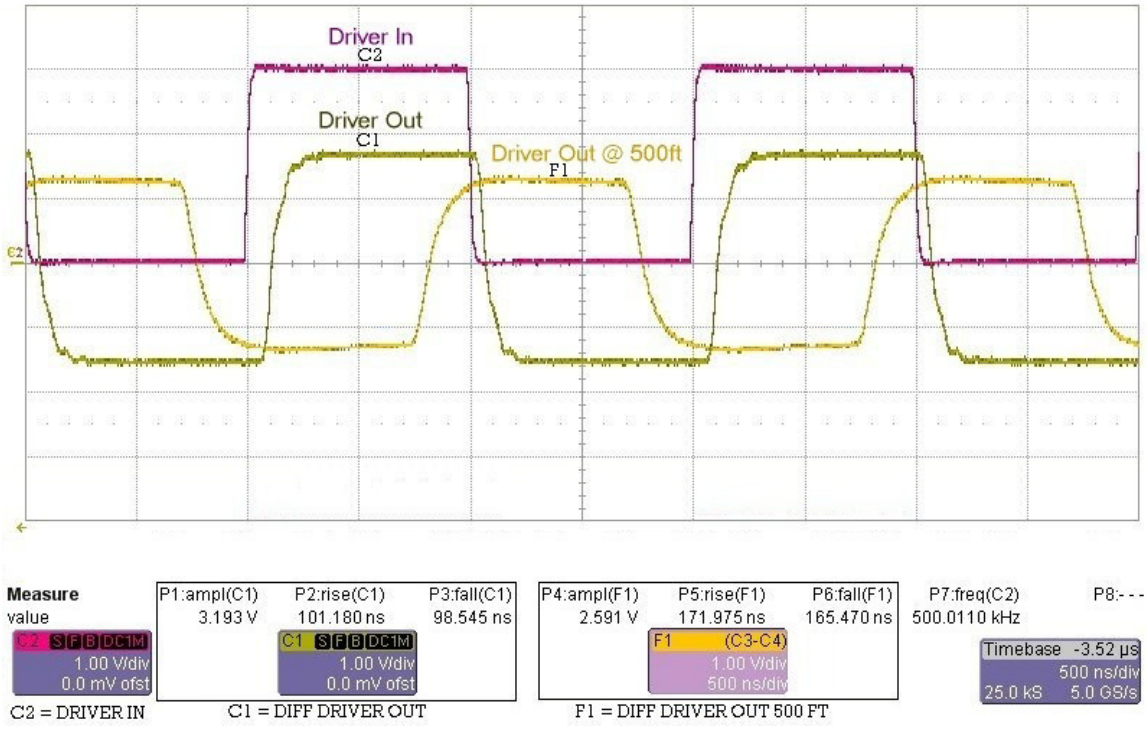


FIGURE 3B – DRS4485 DRIVING 500FT OF BELDEN 3105A, 120Ω CABLE

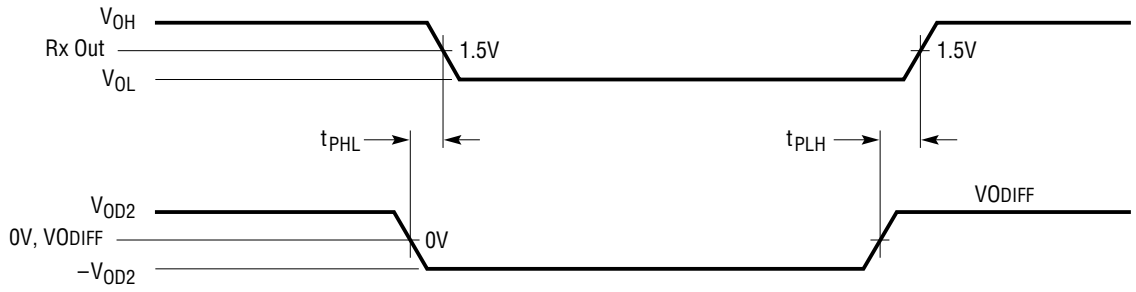


FIGURE 4 – RECEIVER SWITCHING WAVEFORMS

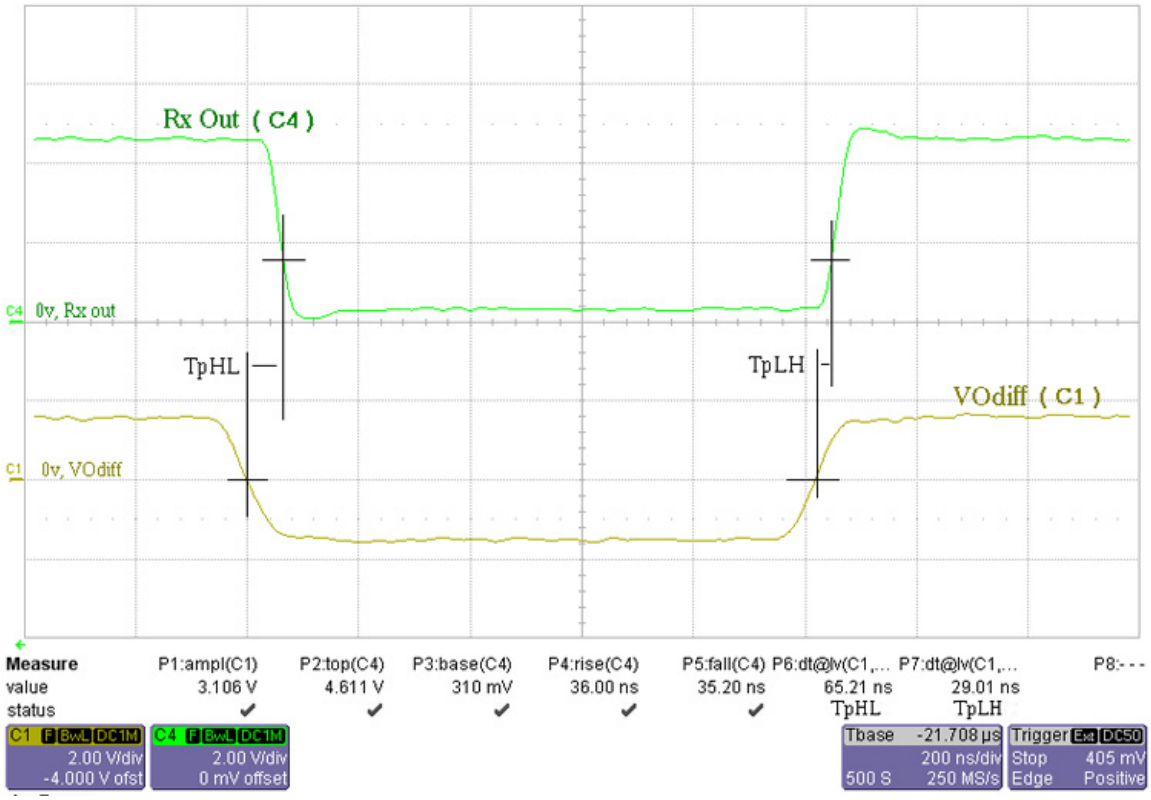
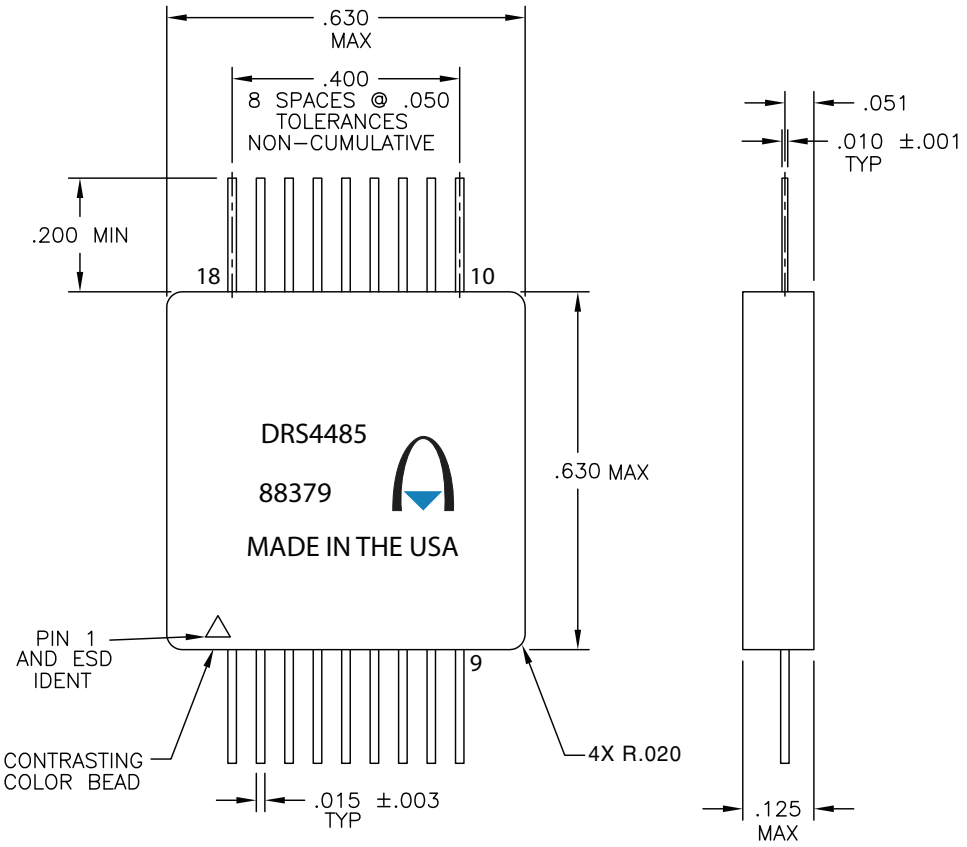


FIGURE 4A – TYPICAL RECEIVER OUTPUTS

PIN # vs FUNCTION TABLE

Pin #	Function	Pin #	Function
1	DRIVER ENABLE 1	10	VCC
2	RECEIVER ENABLE 1	11	GROUND
3	RECEIVER OUT 1	12	BUS 2
4	CASE_GND	13	BUSN 2
5	DRIVER IN 1	14	DRIVER IN 2
6	BUSN 1	15	NC_GND
7	BUS 1	16	RECEIVER OUT 2
8	GROUND	17	RECEIVER ENABLE 2
9	VCC	18	DRIVER ENABLE 2



PACKAGE CONFIGURATION OUTLINE

ORDERING INFORMATION

Model	DLA SMD #	Screening	Case
DRS4485-7	-	Commercial Flow, +25°C testing only	Flat Pack
DRS4485-S	-	Military Temperature, -55°C to +125°C Screened in accordance with the individual Test Methods of MIL-STD-883 for Space Applications	
DRS4485-201-1S	5962-0922601KXC	In accordance with DLA SMD	
DRS4485-201-2S	5962-0922601KXA		
DRS4485-901-1S	5962R0922601KXC	In accordance with DLA Certified RHA Program Plan to RHA Level "R", 100krad(Si)	
DRS4485-901-2S	5962R0922601KXA		

EXPORT CONTROL:

This product is controlled for export under the U.S. Department of Commerce (DoC). A license may be required prior to the export of this product from the United States.

www.aeroflex.com/HiRel info-ams@aeroflex.com

Datasheet Definitions:

Advanced	*Product in Development*
Preliminary	*Shipping Non-Flight Prototypes*
Datasheet	*Shipping QML and Reduced HiRel*

AEROFLEX
A passion for performance.

Our passion for performance is defined by three attributes.

Solution-Minded | Performance-Driven | Customer-Focused