MAX253

Transformer Driver for Isolated RS-485 Interface

Description

The MAX253 is a monolithic oscillator/power-driver, specifically designed to provide isolated power for an isolated RS-485 or RS-232 data interface. It drives a center-tapped transformer primary from a 5V or 3.3V DC power supply. The secondary can be wound to provide any isolated voltage needed at power levels up to 1W.

The MAX253 consists of a CMOS oscillator driving a pair of N-channel power switches. The oscillator runs at double the output frequency, driving a toggle flip-flop to ensure 50% duty cycle to each of the switches. Internal delays are arranged to ensure break-before-make action between the two switches.

The SD pin puts the entire device into a low-power shutdown state, disabling both the power switches and oscillator.

Key Features

- Power-Supply Transformer Driver for Isolated RS-485/RS-232 Data-Interface Applications
- Single +5V or +3.3V Supply
- Low-Current Shutdown Mode: 0.4µA
- Pin-Selectable Frequency: 350kHz or 200kHz
- 8-Pin DIP, SO, and µMAX Packages

Applications / Uses

Bridge Ground Differentials
High Noise-Immunity Communications Interface
Isolated and/or High-Voltage Power Supplies
Isolated RS-485/RS-232 Power Supply
Medical Equipment
Process Control
Transformer Driver

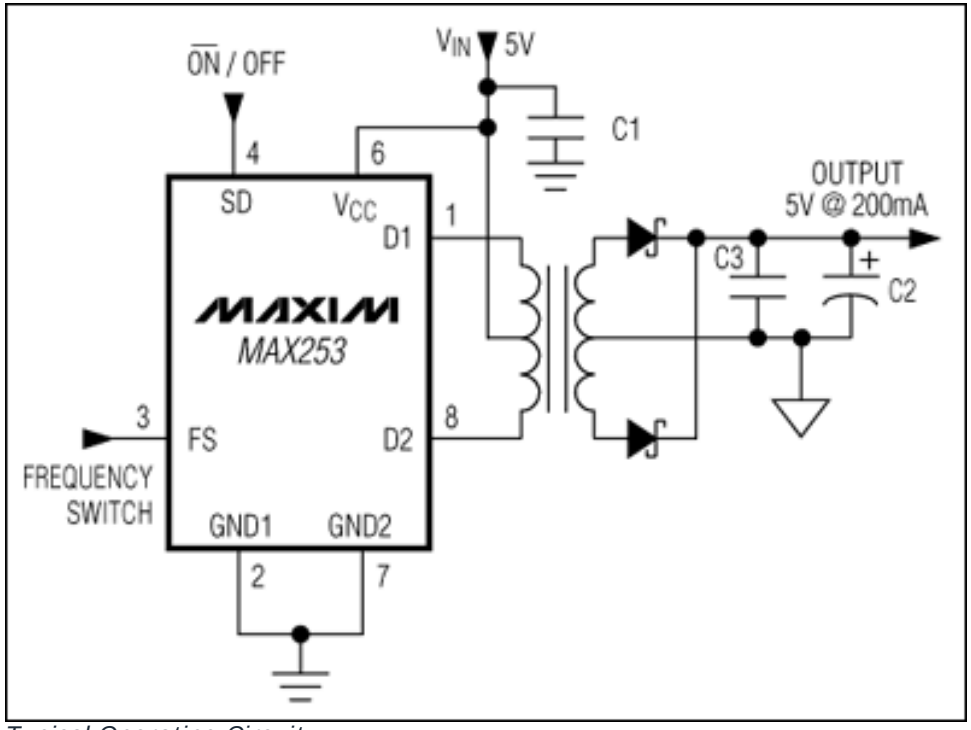
Key Specifications: Isolated Power Supplies

Part Number	V_{IN} (min) (V)	V_{IN} (max) (V)	Topology	Features	Feedback Type	Frequency (kHz)	Operating Current, I_{CC} (max) (mA)	Operating Temp. Range (°C)	

MAX253	2.5	6	Push-Pull	• Thermal Shutdown • UVLO	Open Loop	350	0.45	-55 to +125 -40 to +85 0 to +70	
See All Isolated Power Supplies (29)									

Notes:
**This pricing is BUDGETARY, for comparing similar parts. Prices are in U.S. dollars and subject to change. Quantity pricing may vary substantially and international prices may differ due to local duties, taxes, fees, and exchange rates. For volume-specific prices and delivery, please see the price and availability page or contact an authorized distributor.

Diagram



Typical Operating Circuit

Application Notes

Application Note 1167: Practical Aspects of EMI Protection - MAX253
Application Note 1923: Draw 150mW Of Isolated Power From Off-Hook Phone Line - MAX253
Application Note 2116: RS-485 Data Interface Gives Isolated, Full-Duplex Operation - MAX253

Evaluation Kits

none

Reliability Reports

Show FIT data for:
Reliability Report: MAX253xxA.pdf

Software / Models

MAX253 SPICE Model

Ordering Information

Notes:

1. Other options and links for purchasing parts are listed at:
2. Didn't Find What You Need? Ask our applications engineers. Expert assistance in finding parts, usually within one business day.
3. Part number suffixes: T or T&R = tape and reel; + = RoHS/lead-free; # = RoHS/lead-exempt. More: SeeFull Data Sheet or Part Naming Conventions.
4. * Some packages have variations, listed on the drawing. "PkgCode/Variation" tells which variation the product uses. Note that "+", "#", "-" in the part number suffix describes RoHS status. Package drawings may show a different suffix character.

Devices: 1-20 of 20

MAX253	Free Sample	Buy	Package: TYPE PINS FOOTPRINT DRAWING CODE/VAR *	Temp	RoHS/Lead-Free? Materials Analysis
MAX253MJA			Ceramic DIP;8 pin; Dwg: 21-0045 (PDF) Use pkgcode/variation: J8-2*	-55°C to +125°C	RoHS/Lead-Free: No Materials Analysis
MAX253C/D					See data sheet
MAX253CPA+			PDIP;8 pin; Dwg: 21-0043 (PDF) Use pkgcode/variation: P8+1*	0°C to +70°C	RoHS/Lead-Free: Lead Free Materials Analysis
MAX253CPA			PDIP;8 pin; Dwg: 21-0043 (PDF) Use pkgcode/variation: P8-1*	0°C to +70°C	RoHS/Lead-Free: No Materials Analysis
MAX253EPA			PDIP;8 pin; Dwg: 21-0043 (PDF) Use pkgcode/variation: P8-1*	-40°C to +85°C	RoHS/Lead-Free: No Materials Analysis

MAX253EPA+			PDIP;8 pin; Dwg: 21-0043 (PDF) Use pkgcode/variation: P8+1*	-40°C to +85°C	RoHS/Lead-Free: Lead Free Materials Analysis
MAX253CSA+T			SOIC;8 pin; Dwg: 21-0041 (PDF) Use pkgcode/variation: S8+4*	0°C to +70°C	RoHS/Lead-Free: Lead Free Materials Analysis
MAX253CSA+			SOIC;8 pin; Dwg: 21-0041 (PDF) Use pkgcode/variation: S8+4*	0°C to +70°C	RoHS/Lead-Free: Lead Free Materials Analysis
MAX253CSA			SOIC;8 pin; Dwg: 21-0041 (PDF) Use pkgcode/variation: S8-4*	0°C to +70°C	RoHS/Lead-Free: No Materials Analysis
MAX253CSA-T			SOIC;8 pin; Dwg: 21-0041 (PDF) Use pkgcode/variation: S8-4*	0°C to +70°C	RoHS/Lead-Free: No Materials Analysis
MAX253ESA+			SOIC;8 pin; Dwg: 21-0041 (PDF) Use pkgcode/variation: S8+4*	-40°C to +85°C	RoHS/Lead-Free: Lead Free Materials Analysis
MAX253ESA			SOIC;8 pin; Dwg: 21-0041 (PDF) Use pkgcode/variation: S8-4*	-40°C to +85°C	RoHS/Lead-Free: No Materials Analysis
MAX253ESA-T			SOIC;8 pin; Dwg: 21-0041 (PDF) Use pkgcode/variation: S8-4*	-40°C to +85°C	RoHS/Lead-Free: No Materials Analysis
MAX253ESA+T			SOIC;8 pin; Dwg: 21-0041 (PDF) Use pkgcode/variation: S8+4*	-40°C to +85°C	RoHS/Lead-Free: Lead Free Materials Analysis
MAX253EUA-T				0°C to +70°C	See data sheet
MAX253EUA			uMAX;8 pin; Dwg: 21-0036 (PDF) Use pkgcode/variation: U8-1*	0°C to +70°C	RoHS/Lead-Free: No Materials Analysis
MAX253CUA-T			uMAX;8 pin; Dwg: 21-0036 (PDF) Use pkgcode/variation: U8-1*	0°C to +70°C	RoHS/Lead-Free: No Materials Analysis
MAX253CUA+			uMAX;8 pin; Dwg: 21-0036 (PDF) Use pkgcode/variation: U8+1*	0°C to +70°C	RoHS/Lead-Free: Lead Free Materials Analysis
MAX253CUA+T			uMAX;8 pin; Dwg: 21-0036 (PDF) Use pkgcode/variation: U8+1*	0°C to +70°C	RoHS/Lead-Free: Lead Free Materials Analysis

Transformer Driver for Isolated RS-485 Interface

MAX253

General Description

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The SD pin puts the entire device into a low-power shutdown state, disabling both the power switches and oscillator.

Applications

Isolated RS-485/RS-232 Power-Supply Transformer Driver

High Noise-Immunity Communications Interface

Isolated and/or High-Voltage Power Supplies

Bridge Ground Differentials

Medical Equipment

Process Control

Features

- **Power-Supply Transformer Driver for Isolated RS-485/RS-232 Data-Interface Applications**
- **Single +5V or +3.3V Supply**
- **Low-Current Shutdown Mode: 0.4µA**
- **Pin-Selectable Frequency: 350kHz or 200kHz**
- **8-Pin DIP, SO, and µMAX Packages**

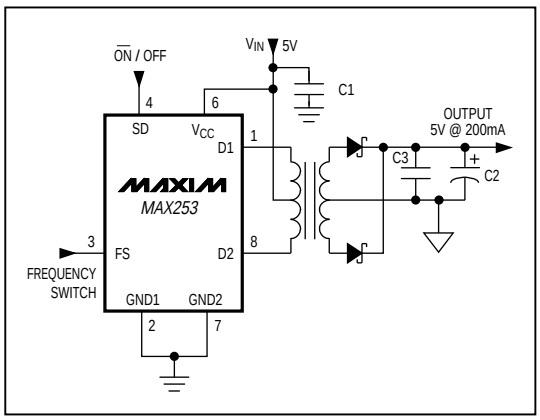
Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE
MAX253CPA	0°C to +70°C	8 Plastic DIP
MAX253CSA	0°C to +70°C	8 SO
MAX253CUA	0°C to +70°C	8 µMAX
MAX253C/D	0°C to +70°C	Dice*
MAX253EPA	-40°C to +85°C	8 Plastic DIP
MAX253ESA	-40°C to +85°C	8 SO
MAX253EUA	-40°C to +85°C	8 µMAX
MAX253MJA	-55°C to +125°C	8 CERDIP**

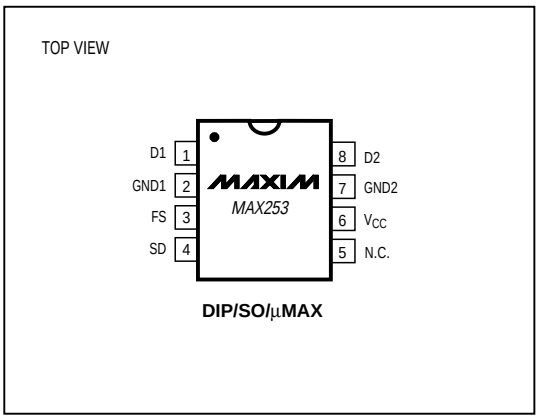
** Contact factory for dice specifications.*

***Contact factory for availability and processing to MIL-STD-883.*

Typical Operating Circuit



Pin Configuration



DIP/SO/µMAX

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) .....-0.3V to +7V
Control Input Voltages (SD, FS) .....-0.3V to (V_{CC} + 0.3V)
Output Switch Voltage (D1, D2).....12V
Peak Output Switch Current (D1, D2).....1A
Average Output Switch Current (D1, D2) 200mA
Continuous Power Dissipation (T_A = +70°C)
Plastic DIP (derate 9.09mW/°C above +70°C) 727mW
SO (derate 5.88mW/°C above +70°C).....471mW
µMAX (derate 4.10mW/°C above +70°C) 330mW
CERDIP (derate 8.00mW/°C above +70°C).....640mW

Operating Temperature Ranges
MAX253C_ _ .....0°C to +70°C
MAX253E_ _ .....-40°C to +85°C
MAX253MJA .....-55°C to +125°C
Junction Temperatures
MAX253C_ _/E_ _.....+150°C
MAX253MJA .....+175°C
Storage Temperature Range .....-65°C to +160°C
Lead Temperature (soldering, 10sec) .....+300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

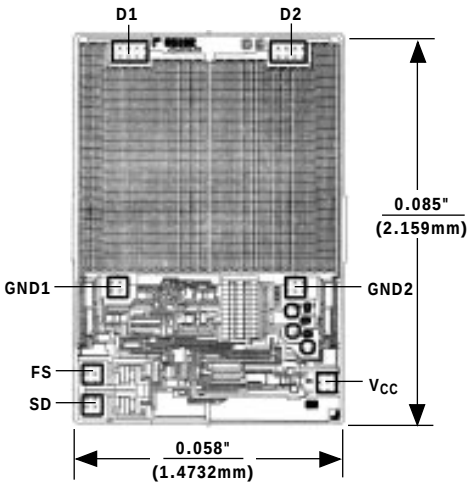
(V_{CC} = 5V ±10%, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A = +25°C.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Switch On Resistance	D1, D2; 100mA		1.5	4.0	Ω
Switch Frequency	FS = V_{CC} or open	250	350	500	kHz
	FS = 0V	150	200	300	
Operating Supply Current (Note 1)	No load, SD = 0V, FS low		0.45	5.0	mA
Shutdown Supply Current (Note 2)	SD = V_{CC}		0.4		µA
Shutdown Input Threshold	High	2.4			V
	Low			0.8	µA
Shutdown Input Leakage Current			10		pA
FS Input Threshold	High	2.4			V
	Low			0.8	
FS Input Leakage Current	FS = 0V			50	µA
	FS = V_{CC}		10		pA
Start-Up Voltage		2.5	2.2		V

Note 1: Operating supply current is the current used by the MAX253 only, not including load current.
Note 2: Shutdown supply current includes output switch-leakage currents.

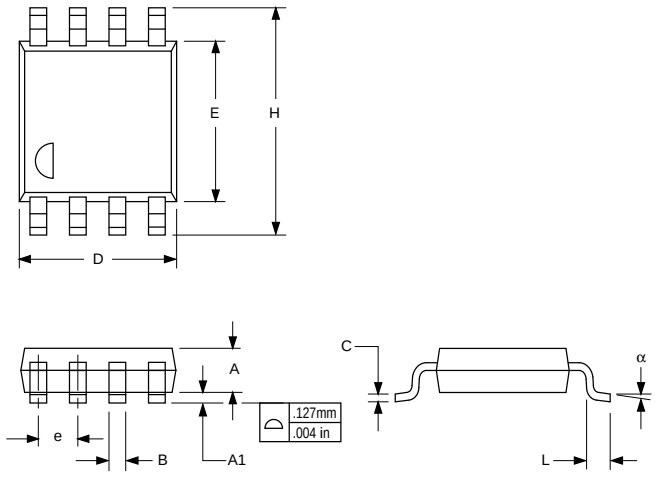
Transformer Driver for Isolated RS-485 Interface

Chip Topography



TRANSISTOR COUNT: 31;
SUBSTRATE CONNECTED TO V_{CC}.

Package Information

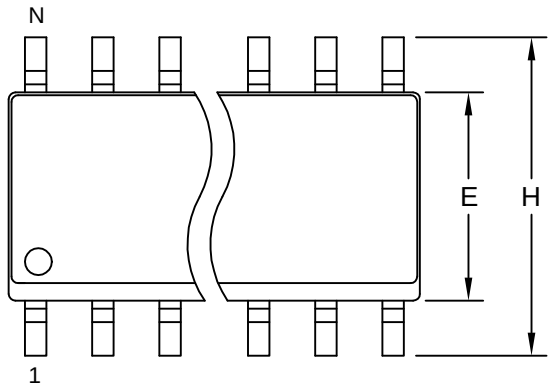


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.032	0.036	0.81	0.91
A1	0.004	0.008	0.10	0.20
B	0.010	0.014	0.25	0.46
C	0.005	0.007	0.13	0.18
D	0.116	0.120	2.95	3.04
E	0.116	0.120	2.95	3.04
e	0.0256		0.65	
H	0.188	0.198	4.90	– –
L	0.016	0.026	0.55	– –
α	0°	6°	0°	6°

21-0036

8-PIN μMAX PACKAGE

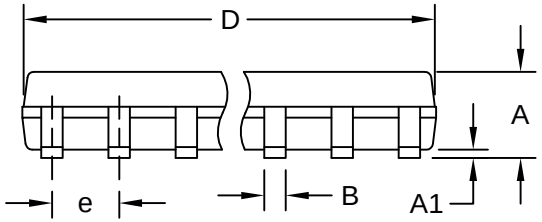
	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
B	0.014	0.019	0.35	0.49
C	0.007	0.010	0.19	0.25
e	0.050 BSC		1.27 BSC	
E	0.150	0.157	3.80	4.00
H	0.228	0.244	5.80	6.20
L	0.016	0.050	0.40	1.27



TOP VIEW

VARIATIONS:

	INCHES		MILLIMETERS			
DIM	MIN	MAX	MIN	MAX	N	MS012
D	0.189	0.197	4.80	5.00	8	AA
D	0.337	0.344	8.55	8.75	14	AB
D	0.386	0.394	9.80	10.00	16	AC



FRONT VIEW

SIDE VIEW

NOTES:
1. D&E DO NOT INCLUDE MOLD FLASH.
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED 0.15mm (.006").
3. LEADS TO BE COPLANAR WITHIN 0.10mm (.004").
4. CONTROLLING DIMENSION: MILLIMETERS.
5. MEETS JEDEC MS012.
6. N = NUMBER OF PINS.

DALLAS SEMICONDUCTOR MAXIM

PROPRIETARY INFORMATION

TITLE:

PACKAGE OUTLINE, .150" SOIC

APPROVAL	DOCUMENT CONTROL NO.	REV.	
	21-0041	B	1/1