QP1631 / QP1632
QP1633 / QP1634

October 9, 2007

CMOS Dual Peripheral Drivers
QP1631 – AND
QP1632 – NAND
QP1633 – OR
QP1634 – NOR

General Description

The QP163x series of dual peripheral drivers are designed to be a universal set of interface components for CMOS circuits.

Each circuit has CMOS compatible inputs with thresholds that track as a function of VCC (approximately 1/2 VCC). The inputs are PNPs providing the high impedance necessary for interfacing with CMOS.

Outputs have high voltage capability; minimum breakdown voltage is 56V at 250 uA.

The outputs are Darlington connected transistors. This allows high current operation (300 mA max) at low internal VCC current levels since base drive for the output transistor is obtained from the load in proportion to the required loading conditions. This is essential in order to minimize loading on the CMOS logic supply.

Typical VCC = 5V power is 28 mW with both outputs ON.

VCC operating range is 4.5V to 15V.

The circuit also features output transistor protection, if the VCC supply is lost, by forcing the output into the high impedance OFF state with the same breakdown levels as when VCC was applied.

Pin-outs are the same as the respective logic functions found in the popular series of circuits; DS75451, DS75461. This feature allows direct conversion of present systems to the MM74C CMOS family and DS163x series circuits with great power savings.

The QP163x series is also TTL compatible at VCC = 5V.

The device type(s) features:

- CMOS compatible inputs
- High impedance inputs; PNP's
- High output voltage breakdown 56V min
- High output current capability 300 mA max
- Same pin-outs and logic functions as DS75451 and DS75461 series circuits
- Low VCC power dissipation (~28 mW both outputs ``ON'' at 5V)

The device/family is constructed using High Voltage Bi-Polar processing.

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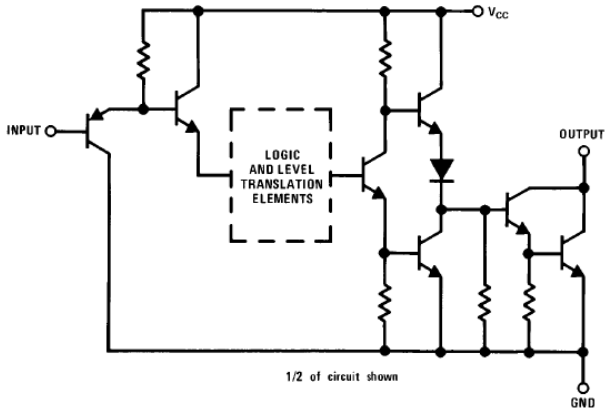
Block Diagrams -(Dual-In-Line and Metal Can Packages)

QP163x

Equivalent Circuit



Pin #	Function	Pin #	Function
Pin 1	A1 – Input	Pin 5	X2 – Ouput
Pin 2	B1 – Input	Pin 6	A2 – Input
Pin 3	X1 – Output	Pin 7	B2 – Input
Pin 4	Ground	Pin 8	Vcc

Test Table

Device	Input Under Test	Other Input	Output Apply	Output Measure
QP1631	V_{IH} V_{IL}	V_{IH} V_{CC}	V_{OH} I_{OL}	I_{OH} V_{OL}
QP1632	V_{IH} V_{IL}	V_{IH} V_{CC}	I_{OL} V_{OH}	V_{OL} I_{OH}
QP1633	V_{IH} V_{IL}	GND V_{IL}	V_{OH} I_{OL}	I_{OH} V_{OL}
QP1634	V_{IH} V_{IL}	GND V_{IL}	I_{OL} V_{OH}	V_{OL} I_{OH}

Truth Table

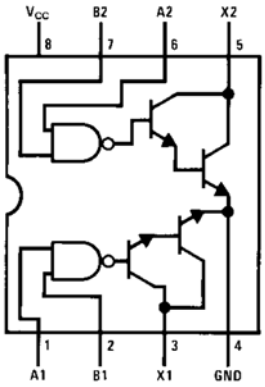
Input		Out			
A	B	1631	1632	1633	1634
0	0	0	1	0	1
0	1	0	1	1	0
1	0	0	1	1	0
1	1	1	0	1	0

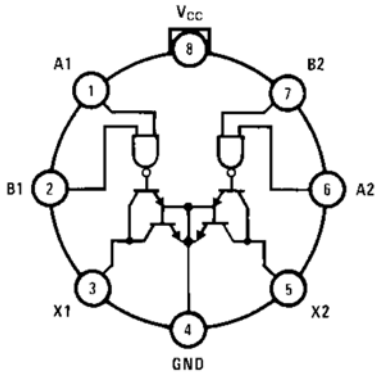
Connection Diagrams

CERDIP

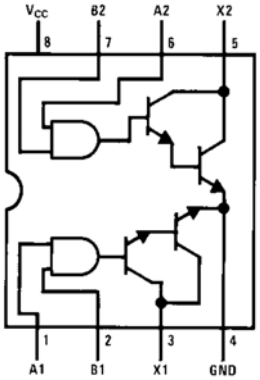
Can

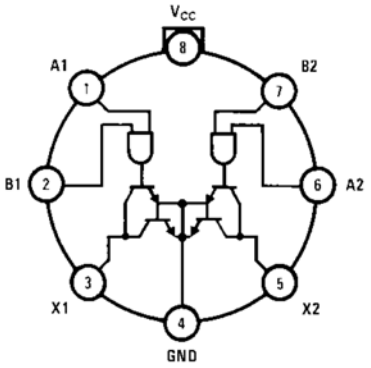
QP1631



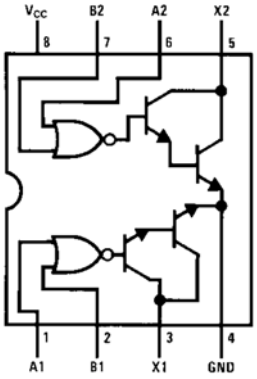


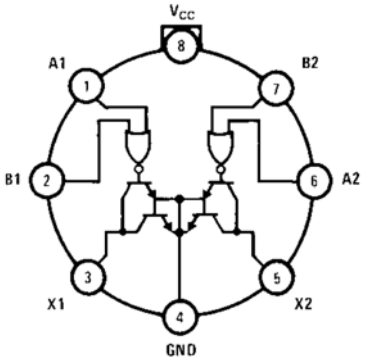
QP1632



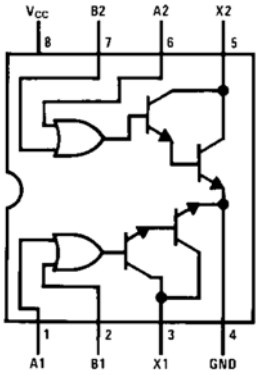


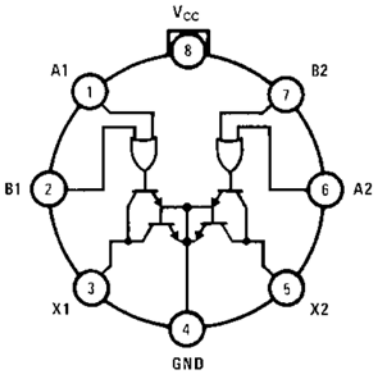
QP1633





QP1634





Absolute Maximum Ratings

Stresses above the AMR may cause permanent damage, extended operation at AMR may degrade performance and affect reliability

Condition		Units	Notes
Power Supply and Input Voltage	-0.5 to +16.0	Volts DC	
Voltage at Inputs	- 0.3 to Vcc+0.3	Volts DC	
Output Voltage	56	Volts	
Storage Temperature Range	-65 to +150	ºC	
Lead Temperature (soldering, 10 seconds)	+260	ºC	
Junction Temperature (T_J)	+175	ºC	
Maximum Power Dissipation Hermetic DIP	1133	mW	/1
Maximum Power Dissipation Hermetic CAN	787	mW	/2

Recommended Operating Conditions

Condition		Units	Notes
Supply Voltage Range (V_{CC})	4.5 to 15	Volts DC	
Operating Range (T_c)	-55C to +125	ºC	/1 /2

/1 – Derate 7.6 mW/°C above 25°C
/2 – Derate 5.2 mW/°C above 25°C

TABLE I – ELECTRICAL PERFORMANCE CHARACTERISTICS

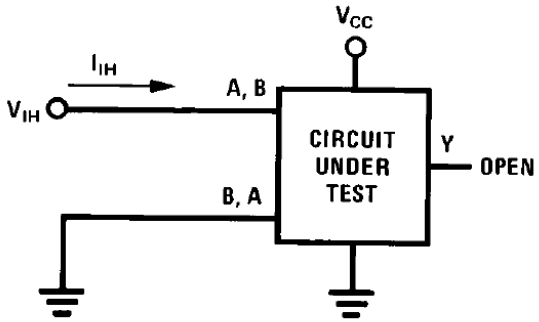
Test	Symbol	Conditions -55ºC ≤TA≤+125ºC Unless Otherwise Specified	Min	Max	Unit
Input High Voltage	V_{IH}	V_{CC} = 5V	3.5		V
		V_{CC} = 10V	8.0		V
		V_{CC} = 15V	12.5		V
Input Low Voltage	V_{IL}	V_{CC} = 5V		1.5	V
		V_{CC} = 10V		2.0	V
		V_{CC} = 15V		2.5	V
Input Low Current	I_{IL}	V_{CC} = 5V, V_{IN} = 0.4V		-115.5	µA
		V_{CC} = 15V, V_{IN} = 0.4V		-360	µA
Output High Voltage	V_{OH}	V_{CC} = 15V, I_{OH}= 250uA	56		V
Output Low Voltage	V_{OL}	V_{CC} = 4.5V, I_{OH}= 100mA		1.1	V
		V_{CC} = 4.5V, I_{OH}= 300mA		1.4	V

TABLE I – ELECTRICAL PERFORMANCE CHARACTERISTICS

Test	Symbol	Conditions -55ºC ≤TA≤+125ºC Unless Otherwise Specified	Min	Max	Unit
Power Supply Current	I_{CCL}				
$V_{IH}=V_{CC}$, V_{IL}=GND	QP1631	V_{CC} = 5V, Vout = Low		11	mA
		V_{CC} = 15V, Vout = Low		20	mA
	QP1632	V_{CC} = 5V, Vout = Low		12	mA
		V_{CC} = 15V, Vout = Low		23	mA
	QP1633	V_{CC} = 5V, Vout = Low		12	mA
		V_{CC} = 15V, Vout = Low		23	mA
	QP1634	V_{CC} = 5V, Vout = Low		12	mA
		V_{CC} = 15V, Vout = Low		23	mA
	I_{CCH}				
	QP1631	V_{CC} = 5V, Vout = High		3	mA
		V_{CC} = 15V, Vout = High		10	mA
	QP1632	V_{CC} = 5V, Vout = High		3.5	mA
		V_{CC} = 15V, Vout = High		14	mA
	QP1633	V_{CC} = 5V, Vout = High		4	mA
		V_{CC} = 15V, Vout = High		15	mA
	QP1634	V_{CC} = 5V, Vout = High		5	mA
		V_{CC} = 15V, Vout = High		18	mA
Propagation Delay, Input to Output	QP1631				
	t_{PDL} 25ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	1.50	us
	t_{PDL} -55ºC, 125ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	1.88	us
	t_{PDH} 25ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	1.20	us
	t_{PDH} -55ºC, 125ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	1.50	us

Propagation Delay, Input to Output	QP1632				
	t_{PDL} 25ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	1.20	us
	t_{PDL} -55ºC, 125ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	1.55	us
	t_{PDH} 25ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	1.20	us
	t_{PDH} -55ºC, 125ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	1.50	us
	QP1633				
	t_{PDL} 25ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	2.00	us
	t_{PDL} -55ºC, 125ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	2.00	us
	t_{PDH} 25ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.001	0.75	us
	t_{PDH} -55ºC, 125ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.001	0.75	us
	QP1634				
	t_{PDL} 25ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	2.00	us
	t_{PDL} -55ºC, 125ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.01	2.00	us
	t_{PDH} 25ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.001	0.75	us
	t_{PDH} -55ºC, 125ºC	V_{CC} = 5.0V C_L = 15pf R_L=50Ω Vout=10V	0.001	0.75	us

I_{IH}



Each input is tested separately.

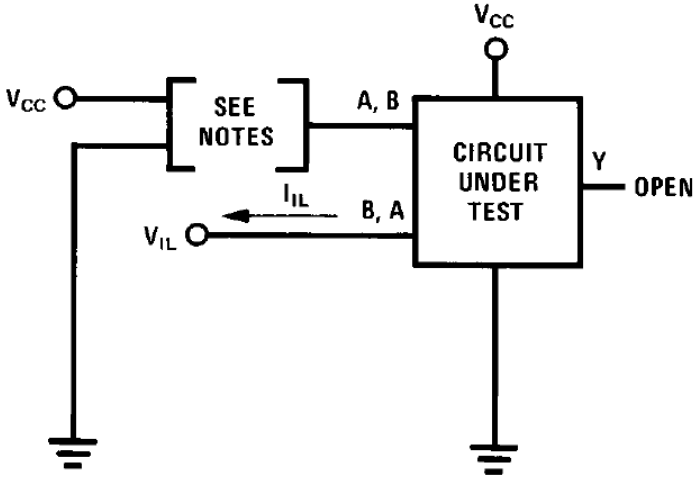
I_{IL}

Notes:

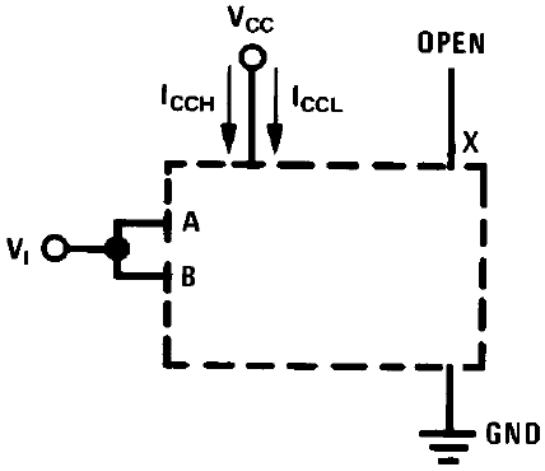
Each input tested separately

QP1631/32 Input not under Test at V_{CC}.

QP1633/34 Input not under test at GND.



I_{CC} for AND/NAND



Ordering Information

Part Number	Package (Mil-Std-1835)	Generic
5962-8863101GA	G – MACY1-X8 – 8 Lead Can	QP1631
5962-8863101PA	P – GDIP1-T8 or CDIP2-T8	QP1631
5962-9052201GA	G – MACY1-X8 – 8 Lead Can	QP1632
5962-9052201PA	P – GDIP1-T8 or CDIP2-T8	QP1632
QP1633/GA	G – MACY1-X8 – 8 Lead Can	QP1633
QP1633/PA	P – GDIP1-T8 or CDIP2-T8	QP1633
5962-8982101GA	G – MACY1-X8 – 8 Lead Can	QP1634
5962-8982101PA	P – GDIP1-T8 or CDIP2-T8	QP1634

QP Semiconductor supports Source Control Drawing (SCD), and custom package development for this product family.

Notes:

Package outline information and specifications are defined by Mil-Std-1835 package dimension requirements.

"-MIL" products manufactured by QP Semiconductor are compliant to the assembly, burn-in, test and quality conformance requirements of Test Methods 5004 & 5005 of Mil-Std-883 for Class B devices. This datasheet defines the electrical test requirements for the device(s).

The listed drawings, Mil-PRF-38535, Mil-Std-883 and Mil-Std-1835 are available online at http://www.dscc.dla.mil/

Additional information is available at our website http://www.qpsemi.com