Advance Information

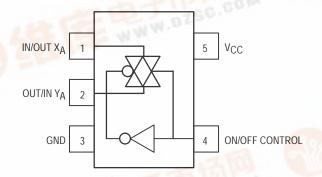
Analog Switch

The MC74VHC1GT66 is an advanced high speed CMOS bilateral analog switch fabricated with silicon gate CMOS technology. It achieves high speed propagation delays and low ON resistances while maintaining CMOS low power dissipation. This bilateral switch controls analog and digital voltages that may vary across the full power–supply range (from VCC to GND).

The MC74VHC1GT66 is compatible in function to a single gate of the very High Speed CMOS MC74VHCT4066. The device has been designed so that the ON resistances (R_{ON}) are much lower and more linear over input voltage than R_{ON} of the metal–gate CMOS or High Speed CMOS analog switches.

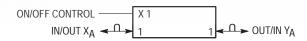
The ON/OFF Control input is compatible with TTL-type input thresholds allowing the device to be used as a logic-level translator from 3.0V CMOS logic to 5.0V CMOS logic or from 1.8V CMOS logic to 3.0V CMOS logic while operating at the high-voltage power supply. The input protection circuitry on this device allows overvoltage tolerance on the input, which provides protection when voltages of up to 7V are applied, regardless of the supply voltage. This allows the MC74VHC1GT66 to be used to interface 5V circuits to 3V circuits.

- Low Power Dissipation: $I_{CC} = 2 \mu A$ (Max) at $T_A = 25^{\circ}C$
- Diode Protection Provided on Inputs and Outputs
- Improved Linearity and Lower ON Resistance over Input Voltage
- Pin and Function Compatible with Other Standard Logic Families
- Latchup Performance Exceeds 300 mA
- ESD Performance: HBM > 2000 V; MM > 200 V, CDM > 1500 V



5-Lead SOT-353 Pinout (Top View)

LOGIC SYMBOL





ON Semiconductor

Formerly a Division of Motorola http://onsemi.com



SC-88A / SOT-353 DF SUFFIX CASE 419A

MARKING DIAGRAM



Pin 1

d = Date Code

	PIN ASSIGNMENT							
1	IN/OUT X _A							
2	OUT/IN Y _A							
3	GND							
4	ON/OFF CONTROL							
5	VCC							

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

FUNCTION TABLE

State of Analog Switch
Off
On

ABSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Value	Unit
DC Supply Voltage	Vcc	-0.5 to +7.0	V
Digital Input Voltage	VIN	-0.5 to V _{CC} +0.5	V
Analog Output Voltage	VIS	-0.5 to V _{CC} + 0.5	V
Digital Input Diode Current	ΙK	-20	mA
DC Supply Current, V _{CC} and GND	Icc	+25	mA
Power dissipation in still air, SC-88A †	PD	200	mW
Lead temperature, 1 mm from case for 10 s	TL	260	°C
Storage temperature	T _{stg}	-65 to +150	°C

[†]Derating — SC–88A Package: –3 mW/°C from 65° to 125°C

RECOMMENDED OPERATING CONDITIONS

Characteristics	Symbol	Min	Max	Unit
DC Supply Voltage	V _{CC}	4.5	5.5	V
Digital Input Voltage	VIN	GND	Vcc	V
Analog Input Voltage	V _{IS}	GND	Vcc	V
Static or Dynamic Voltage Across Switch	V _{IO} *		1.2	V
Operating Temperature Range	TA	- 55	+85	°C
Input Rise and Fall Time ON/OFF Control Input $V_{CC} = 3.3V \pm 0.3V$ $V_{CC} = 5.0V \pm 0.5V$	t _r , t _f	0	100 20	ns/V

^{*} For voltage drops across the switch greater than 1.2V (switch on), excessive V_{CC} current may be drawn; i.e. the current out of the switch may contain both V_{CC} and switch input components. The reliability of the device will be unaffected unless the Maximum Ratings are exceeded.

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DC ELECTRICAL CHARACTERISTICS

			VCC	1	A = 25°0	2	T _A ≤	85°C	T _A ≤	125°C	
Symbol	Parameter	Test Conditions	(V)	Min	Тур	Max	Min	Max	Min	Max	Unit
VIH	Minimum High–Level Input Voltage ON/OFF Control Input	R _{ON} = Per Spec	3.0 4.5 5.5	1.2 2.0 2.0			1.2 2.0 2.0		1.2 2.0 2.0		V
V _{IL}	Maximum Low–Level Input Voltage ON/OFF Control Input	R _{ON} = Per Spec	3.0 4.5 5.5			0.53 0.8 0.8		0.53 0.8 0.8		0.53 0.8 0.8	V
I _{IN}	Maximum Input Leakage Current ON/OFF Control Input	$V_{IN} = V_{CC}$ or GND	0 to 5.5			±0.1		±1.0		±1.0	μΑ
ICC	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND $V_{IO} = 0V$	5.5			2.0		20		40	μΑ
ICCT	Quiescent Supply Current	ON/OFF Control at 3.4V	5.5			1.35		1.5		1.65	mA
R _{ON}	Maximum "ON" Resistance	$V_{IN} = V_{IH}$ $V_{IS} = V_{CC}$ or GND $ I_{IS} \le 10$ mA (Figure 1)	3.0 4.5 5.5		30 20 15	50 30 20		70 40 35		100 50 45	Ω
		Endpoints $V_{IN} = V_{IH}$ $V_{IS} = V_{CC}$ or GND $ I_{IS} \le 10$ mA (Figure 1)	3.0 4.5 5.5		25 12 8	50 20 15		65 26 23		90 40 32	Ω
lOFF	Maximum Off–Channel Leakage Current	V _{IN} = V _{IL} V _{IS} = V _{CC} or GND Switch Off (Figure 2)	5.5			0.1		0.5		1.0	μΑ
I _{ON}	Maximum On–Channel Leakage Current	V _{IN} = V _{IH} V _{IS} = V _{CC} or GND Switch On (Figure 3)	5.5			0.1		0.5		1.0	μΑ

AC ELECTRICAL CHARACTERISTICS (C_{load} = 50 pF, Input t_{r}/t_{f} = 3.0ns)

			VCC	1	T _A = 25°(;	T _A ≤	85°C	T _A ≤ '	125°C	
Symbol	Parameter	Test Conditions	(V)	Min	Тур	Max	Min	Max	Min	Max	Unit
^t PLH [,] ^t PHL	Maximum Propogation Delay, Input X to Y	Y _A = Open Figure 4	2.0 3.0 4.5 5.5		1 0 0 0	5 2 1 1		6 3 1 1		7 4 2 1	ns
tPLZ, tPHZ	Maximum Propogation Delay, ON/OFF Control to Analog Output	R_L = 1000 $Ω$ Figure 5	2.0 3.0 4.5 5.5		15 8 6 4	35 15 10 7		46 20 13 9		57 25 17 11	ns
t _{PZL} , t _{PZH}	Maximum Propogation Delay, ON/OFF Control to Analog Output	R_L = 1000 $Ω$ Figure 5	2.0 3.0 4.5 5.5		15 8 6 4	35 15 10 7		46 20 13 9		57 25 17 11	ns
C _{IN}	Maximum Input	ON/OFF Control Input	0.0		3	10		10		10	pF
	Capacitance	Contol Input = GND Analog I/O Feedthrough	5.0		4 4	10 10		10 10		10 10	

		Typical @ 25°C, V _{CC} = 5.0V	
C _{PD}	Power Dissipation Capacitance (Note NO TAG)	18	pF

^{1.} CpD is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{CC}(OPR) = CpD \bullet V_{CC} \bullet f_{in} + I_{CC} \cdot CpD$ is used to determine the no–load dynamic power consumption; $P_D = CpD \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

ADDITIONAL APPLICATION CHARACTERISTICS (Voltages Referenced to GND Unless Noted)

Symbol	Parameter	Test Conditions	vcc	Limit 25°C	Unit
BW	Maximum On–Channel Bandwidth or Minimum Frequency Response Figure 7	f_{in} = 1 MHz Sine Wave Adjust f_{in} voltage to obtain 0 dBm at V _{OS} Increase f_{in} = frequency until dB meter reads –3dB R _L = 50 Ω , C _L = 10 pF	3.0 4.5 5.5	150 175 200	MHz
ISO _{off}	Off-Channel Feedthrough Isolation Figure 8	f_{in} = Sine Wave Adjust f_{in} voltage to obtain 0 dBm at V_{IS} f_{in} = 10 kHz, R_L = 600 Ω , C_L = 50 pF	3.0 4.5 5.5	-50 -50 -50	dB
		$f_{in} = 1.0 \text{ kHz}, R_L = 50\Omega, C_L = 10 \text{ pF}$	3.0 4.5 5.5	-40 -40 -40	
NOISE _{feed}	Feedthrough Noise Control to Switch Figure 9	$V_{in} \le 1$ MHz Square Wave $(t_f = t_f = 2ns)$ Adjust R _L at setup so that $I_S = 0$ A R _L = 600Ω , C _L = 50 pF	3.0 4.5 5.5	45 60 130	mV _{PP}
		$R_L = 50\Omega$, $C_L = 10 pF$	3.0 4.5 5.5	25 30 60	
THD	Total Harmonic Distortion Figure 10	$f_{in} = 1 \text{ kHz}, R_L = 10 \text{k}\Omega, C_L = 50 \text{ pF}$ $THD = THD_{Measured} - THD_{Source}$ $V_{IS} = 3.0 \text{ Vpp sine wave}$ $V_{IS} = 4.0 \text{ Vpp sine wave}$ $V_{IS} = 5.0 \text{ Vpp sine wave}$	3.3 4.5 5.5	0.20 0.10 0.06	%

^{1.} C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in}+I_{CC}. C_{PD} is used to determine the no–load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in}+I_{CC} • V_{CC}.

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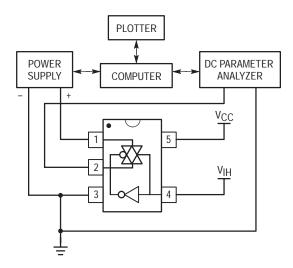


Figure 1. On Resistance Test Set-Up

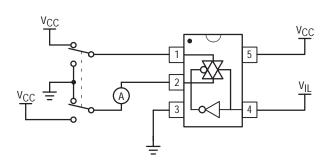


Figure 2. Maximum Off-Channel Leakage Current Test Set-Up

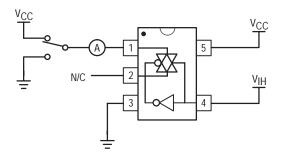


Figure 3. Maximum On–Channel Leakage Current Test Set–Up

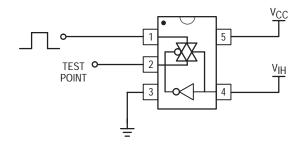


Figure 4. Propagation Delay Test Set-Up

Switch to Position 1 when testing t_{PLZ} and t_{PZL} Switch to Position 2 when testing t_{PHZ} and t_{PZH} TEST POINT

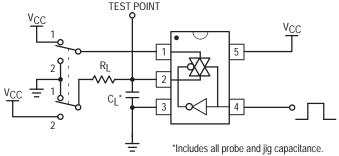


Figure 5. Propagation Delay Output Enable/Disable Test Set-Up

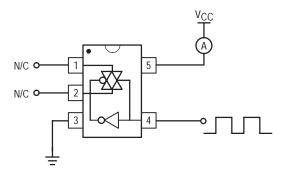
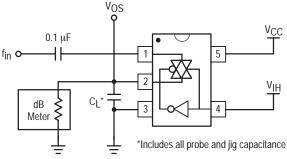


Figure 6. Power Dissipation Capacitance Test Set-Up

VIS

Vos



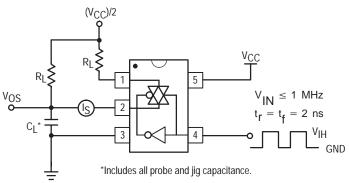
 V_{CC} $0.1 \, \mu F$ 5 C_L^* dΒ R_L ≸ Meter *Includes all probe and jig capacitance. *Includes all probe and jig capacitance.

To Distortion Meter

(V_{CC})/2

Figure 7. Maximum On-Channel Bandwidth Test Set-Up

Figure 8. Off-Channel Feedthrough Isolation Test Set-Up



 C_L *Includes all probe and jig capacitance.

Figure 9. Feedthrough Noise, ON/OFF Control to Analog Out, Test Set-Up

Figure 10. Total Harmonic Distortion Test Set-Up

VCC

 V_{IH}

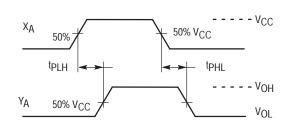


Figure 11. Propagation Delay, **Analog In to Analog Out Waveforms**

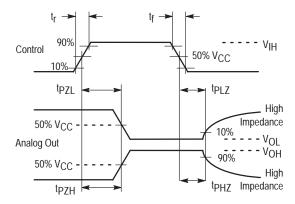


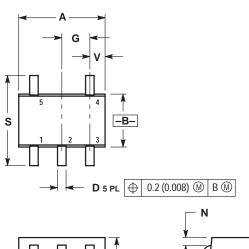
Figure 12. Propagation Delay, ON/OFF Control

DEVICE ORDERING INFORMATION

Device Nomenclature								
Device Order Number	Circuit Indicator	Temp Range Identifier	Technology	Device Function	Package Suffix	Tape & Reel Suffix	Package Type	Tape and Reel Size
MC74VHC1GT66DFT1	MC	74	VHC1G	T66	DF	T1	SC-88A / SOT-353	7–Inch/3000 Unit

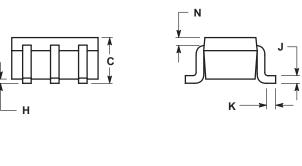
PACKAGE DIMENSIONS

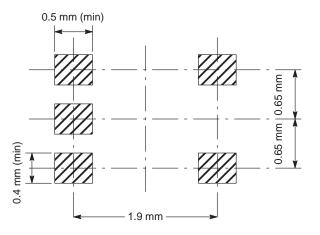
SC-88A / SOT-353 **DF SUFFIX** 5-LEAD PACKAGE CASE 419A-01 ISSUE B



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MM.

	INC	HES	MILLIN	IETERS
DIM	MIN	MIN MAX		MAX
Α	0.071	0.087	1.80	2.20
В	0.045	0.053	1.15	1.35
С	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026	BSC	0.65	BSC
Н		0.004		0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008	REF	0.20	REF
S	0.079	0.087	2.00	2.20
٧	0.012	0.016	0.30	0.40





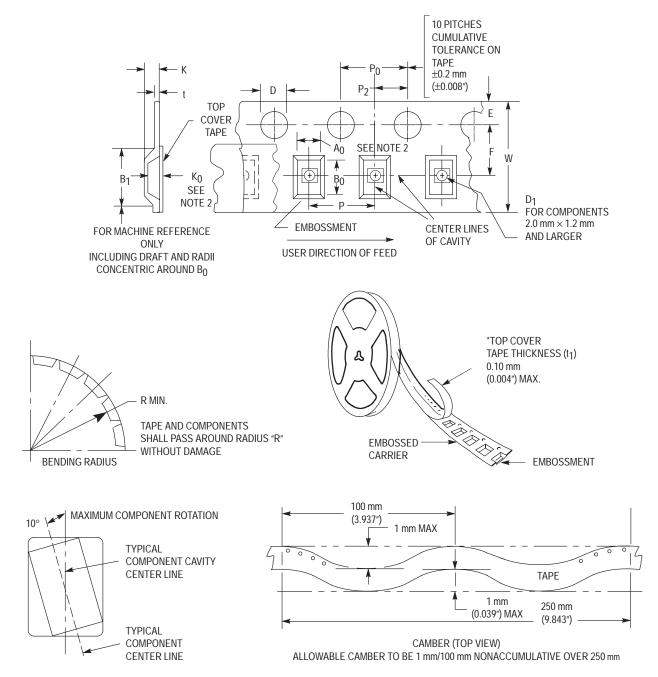


Figure 13. Carrier Tape Specifications

EMBOSSED CARRIER DIMENSIONS (See Notes 1 and 2)

Tape Size	B ₁ Max	D	D ₁	E	F	К	Р	P ₀	P ₂	R	Т	w
8 mm	4.35 mm (0.171")	1.5 +0.1/ -0.0 mm (0.059 +0.004/ -0.0")	1.0 mm Min (0.039")	1.75 ±0.1 mm (0.069 ±0.004")	3.5 ±0.5 mm (1.38 ±0.002")	2.4 mm (0.094")	4.0 ±0.10 mm (0.157 ±0.004")	4.0 ±0.1 mm (0.156 ±0.004")	2.0 ±0.1 mm (0.079 ±0.002")	25 mm (0.98")	0.3 ±0.05 mm (0.01 +0.0038/ -0.0002")	8.0 ±0.3 mm (0.315 ±0.012")

^{1.} Metric Dimensions Govern-English are in parentheses for reference only.

^{2.} A₀, B₀, and K₀ are determined by component size. The clearance between the components and the cavity must be within 0.05 mm min to 0.50 mm max. The component cannot rotate more than 10° within the determined cavity

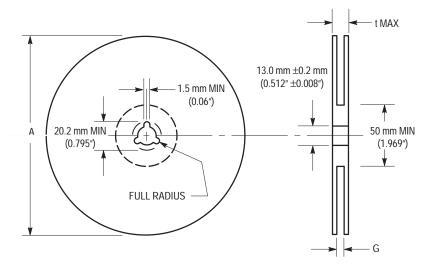


Figure 14. Reel Dimensions

REEL DIMENSIONS

Tape Size	A Max	G	t Max
8 mm	330 mm	8.400 mm, +1.5 mm, -0.0	14.4 mm
	(13")	(0.33", +0.059", -0.00)	(0.56")

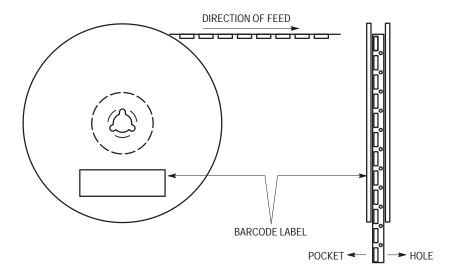


Figure 15. Reel Winding Direction

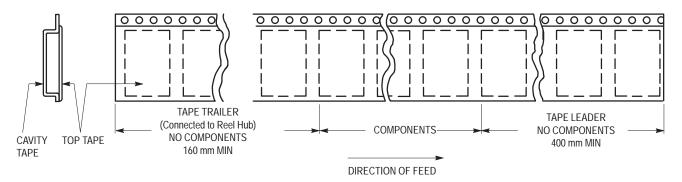


Figure 16. Tape Ends for Finished Goods

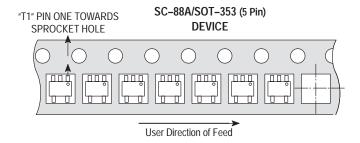


Figure 17. Reel Configuration

Notes

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