Contents

1 Pin information

Figure 1. Pin connections (top view)

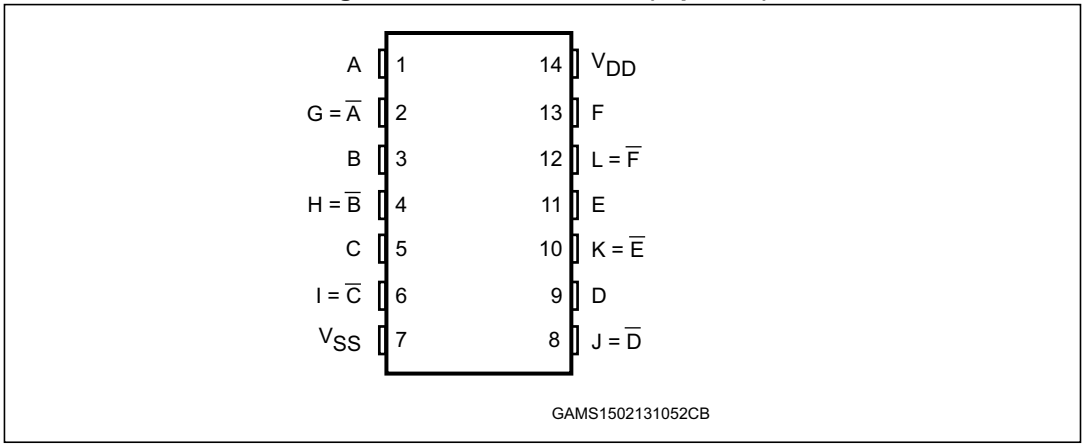
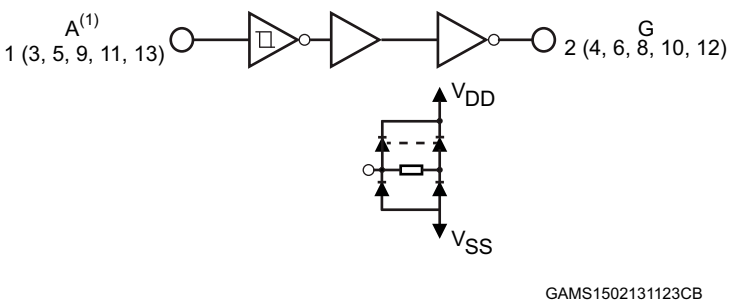


Table 2. Pin description

Pin no	Symbol	Name and function
1, 3, 5, 9, 11, 13	A, B, C, D, E, F	Data inputs
2, 4, 6, 8, 10, 12	G, H, I, J, K, L	Data outputs
7	V_{SS}	Negative supply voltage
14	V_{DD}	Positive supply voltage

2 Functional description

Figure 2. Logic diagram



1. All inputs protected by COS/MOS protection network.

Table 3. Truth table

Inputs (A to F)	Outputs (G to L)
L	H
H	L

Figure 3. Functional diagram

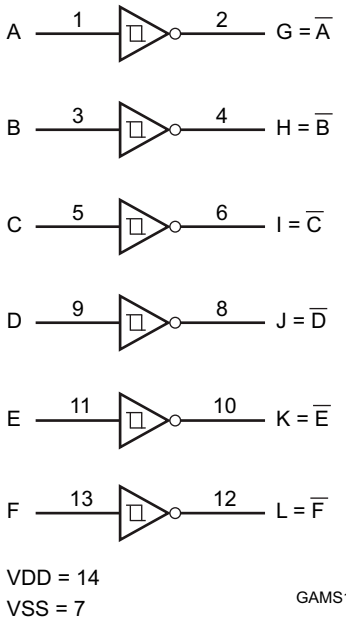
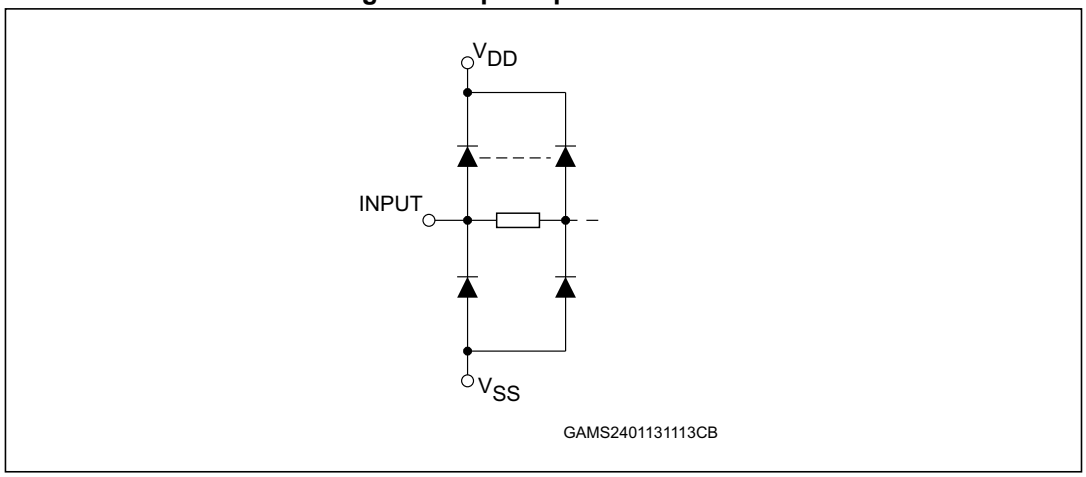


Figure 4. Input equivalent circuit



3 Electrical characteristics

Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. All voltage values are referred to V_{SS} pin voltage.

Table 4. Absolute maximum ratings (AMR)

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	-0.5 to +22	V
V_I	DC input voltage	-0.5 to V_{DD} + 0.5	
I_I	DC input current	±10	mA
P_D	Power dissipation per package	200	mW
	Power dissipation per output transistor	100	
T_{op}	Operating temperature	-55 to +125	°C
T_{stg}	Storage temperature	-65 to +150	

Table 5. Recommended operating conditions

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	3 to 20	V
V_I	Input voltage	0 to V_{DD}	
T_{op}	Operating temperature	-55 to 125	°C

Table 6. DC specifications(1)

Sym.	Parameter	Test condition				Value							Unit
		V_I (V)	V_O (V)	$\|I_O\|$ (µA)	V_{DD}(V)	T_A = 25 °C			-40 to 85 °C		-55 to 125 °C		
						Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
I_L	Quiescent current	0/5			5			1		30		30	µA
		0/10			10		0.02	2		60		60	
		0/15			15			4		120		120	
		0/20			20		0.04	20		600		600	
V_{OH}	High level output voltage	0/5		<1	5	4.95			4.95		4.95		V
		0/10			10	9.95			9.95		9.95		
		0/15			15	14.95			14.95		14.95		
V_{OL}	Low level output voltage	5/0		<1	5		0.05			0.05		0.05	
		10/0			10								
		15/0			15								
V_P	Positive trigger threshold voltage				5	2.2	2.9	3.6	2.2	3.6	2.2	3.6	
					10	4.6	5.9	7.1	4.6	7.1	4.6	7.1	
					15	6.8	8.8	10.8	6.8	10.8	6.8	10.8	
V_N	Negative trigger threshold voltage				5	0.9	1.9	2.8	0.9	2.8	0.9	2.8	
					10	2.5	3.9	5.2	2.5	5.2	2.5	5.2	
					15	4	5.8	7.4	4	7.4	4	7.4	
V_H	Hysteresis voltage				5	0.3	0.9	1.6	0.3	1.6	0.3	1.6	
					10	1.2	2.3	3.4	1.2	3.4	1.2	3.4	
					15	1.6	3.5	5	1.6	5	1.6	5	
I_{OH}	Output drive current	0/5	2.5		5	-1.36	-3.2		-1.15		-1.1		mA
			4.6			-0.44	-1		-0.36		-0.36		
		0/10	9.5		10	-1.1	-2.6		-0.9		-0.9		
		0/15	13.5		15	-3.0	-6.8		-2.4		-2.4		
I_{OL}	Output sink current	0/5	0.4		5	0.44	1		0.36		0.36		mA
		0/10	0.5		10	1.1	2.6		0.9		0.9		
		0/15	1.5		15	3.0	6.8		2.4		2.4		
I_I	Input leakage current	0/18	Any input		18		$\pm 10^{-5}$	±0.1		±1		±1	µA
C_I	Input capacitance		Any input				5	7.5					pF

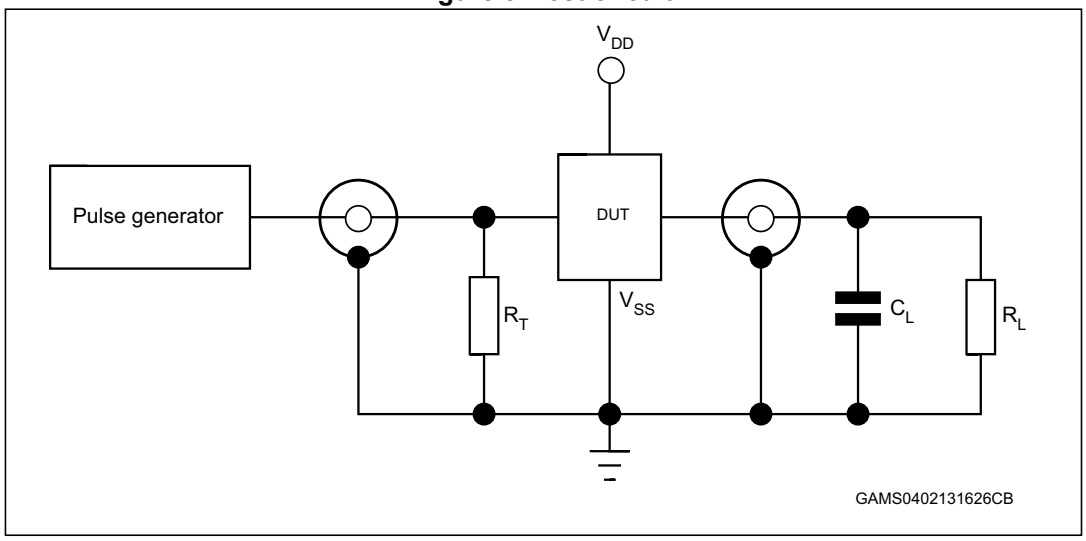
1. The noise margin for both level "1" and "0" is: 1 V min. with V_{DD} = 5 V, 2 V min. with V_{DD} = 10 V, and 2.5 V min. with V_{DD} = 15 V.

Table 7. Dynamic electrical characteristics
(T_{amb} = 25 °C, C_L = 50 pF, R_L = 200 kΩ, $t_r = t_f$ = 20 ns)

Symbol	Parameter	Test condition	Value(1)		Unit
		V_{DD} (V)	Typ.	Max.	
t_{PLH}, t_{PHL}	Propagation delay time	5	140	280	ns
		10	70	140	
		15	60	120	
t_{TLH}, t_{THL}	Output transition time	5	100	200	
		10	50	100	
		15	40	80	

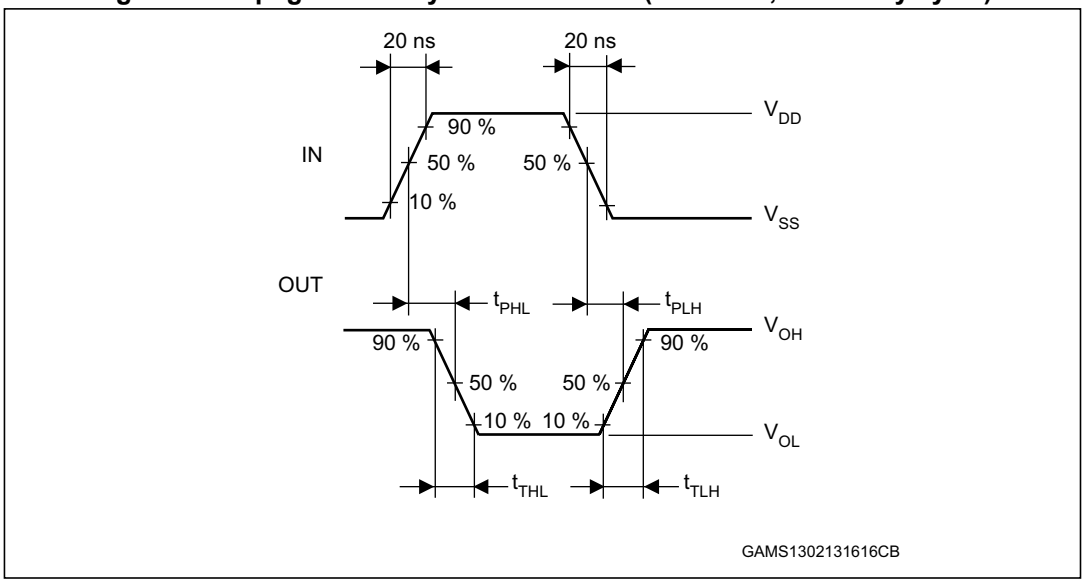
1. The typical temperature coefficient for all V_{DD} values is 0.3 %/°C.

Figure 5. Test circuit



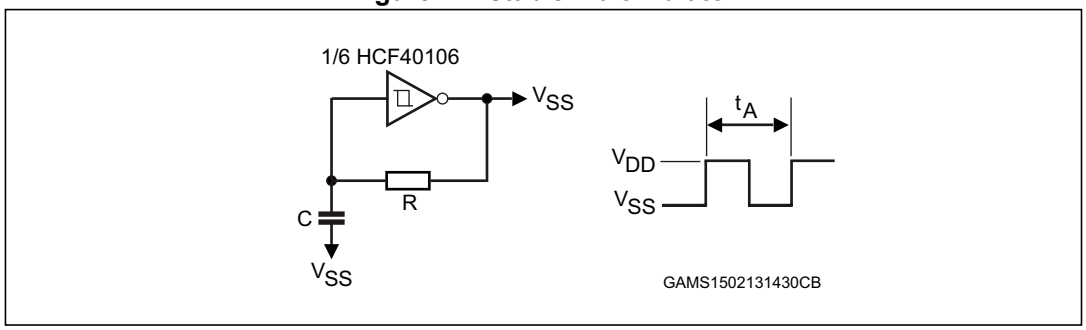
1. Legend: C_L = 50 pF or equivalent (includes jig and probe capacitance), R_L = 200 KΩ, $R_T = Z_{OUT}$ of pulse generator (typically 50 Ω)

Figure 6. Propagation delay time waveform (f = 1 MHz; 50 % duty cycle)



4 Typical applications

Figure 7. Astable multivibrator



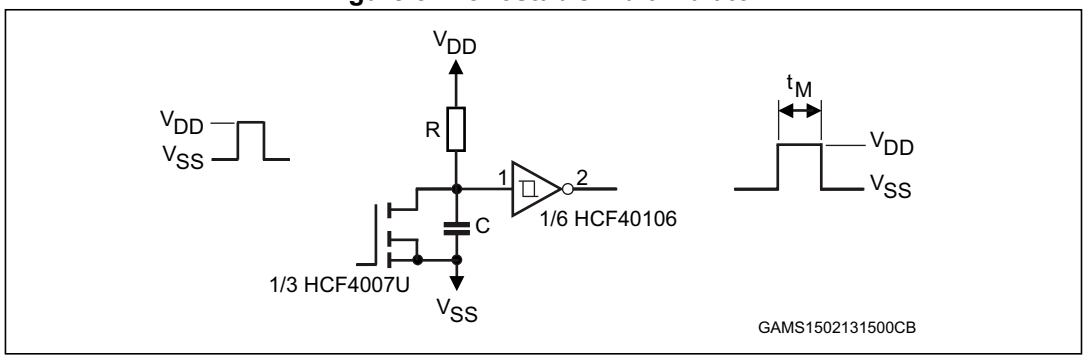
$$t_A = RC\ln\left[\left(\frac{V_P}{V_N}\right)\left(\frac{V_{DD}-V_N}{V_{DD}-V_P}\right)\right]$$

$50\ k\Omega \leq R \leq 1\ m\Omega$

$100\ pF \leq C \leq 1\ \mu F$

For the range of R and C given $2\ \mu s < t_A < 0.4\ s$

Figure 8. Monostable multivibrator



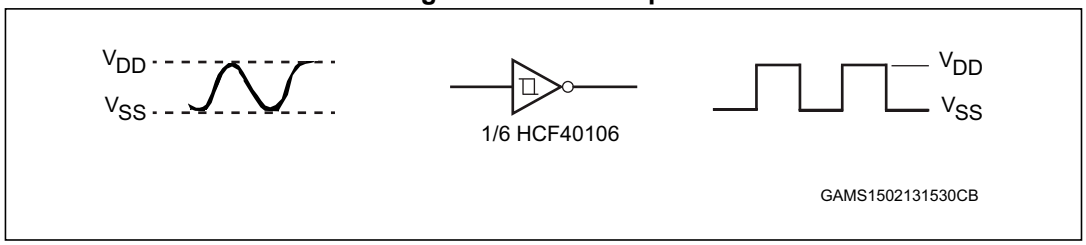
$$t_M = RC\ln\left(\frac{V_{DD}}{V_{DD}-V_P}\right)$$

$50\ k\Omega \leq R \leq 1\ m\Omega$

$100\ pF \leq C \leq 1\ \mu F$

For the range of R and C given $5\ \mu s < t_M < 1s$

Figure 9. Wave sharper



The frequency range of the wave shape is from DC to 1 MHz.

5 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*.
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Figure 10. SO-14 package mechanical drawing

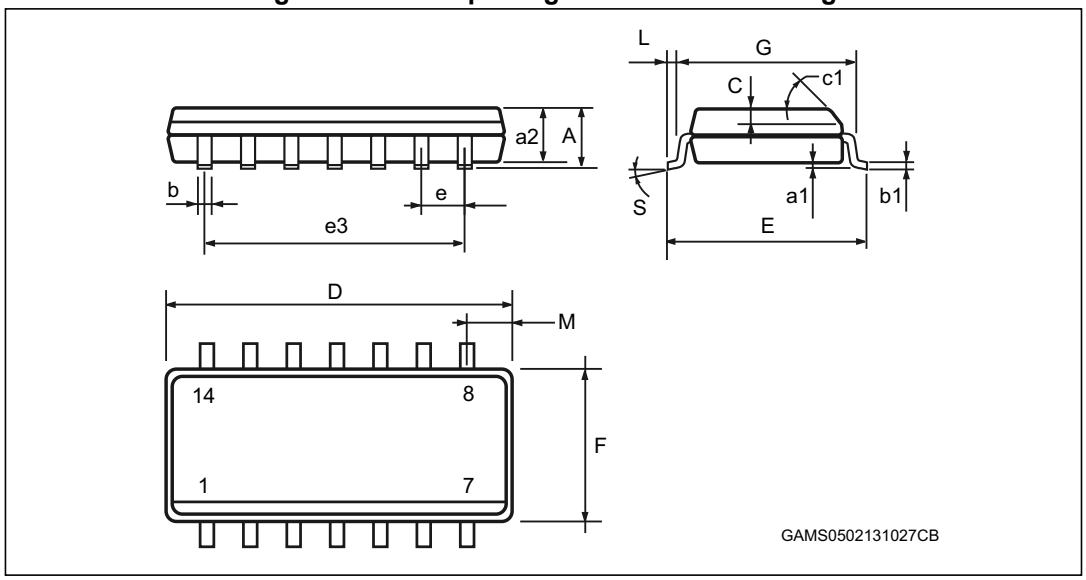
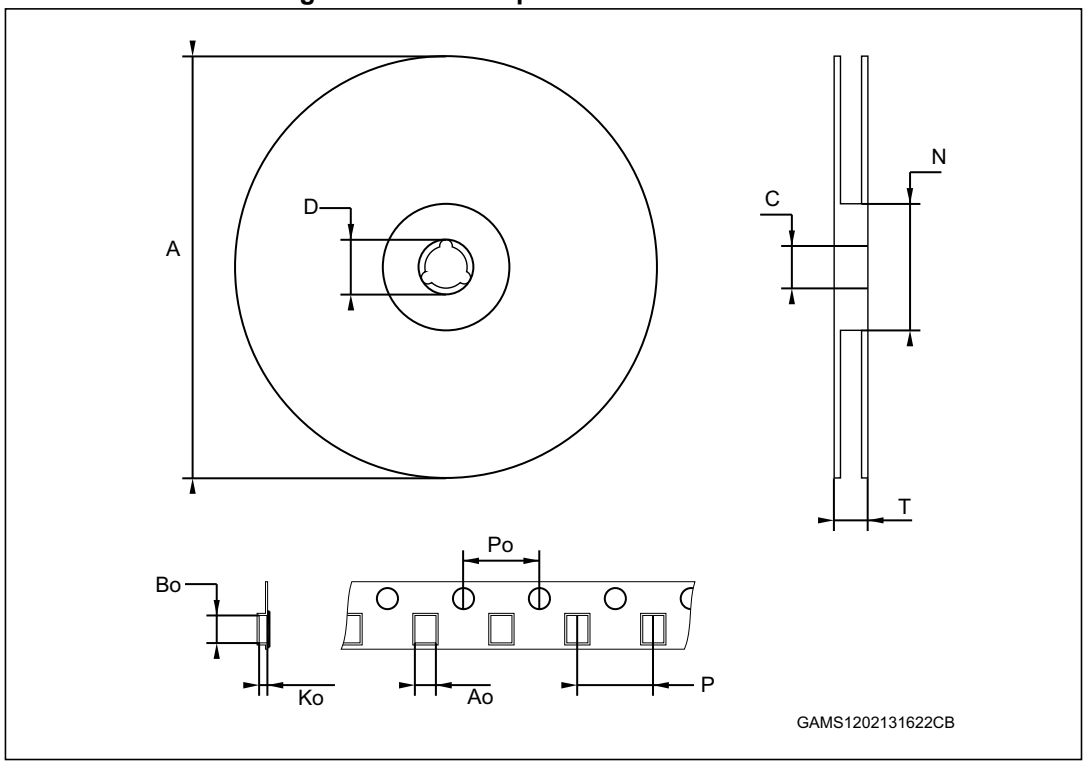


Table 8. SO-14 package mechanical data

Ref	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1		45 °			45 °	
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.68			0.026
S			8 °			8 °

Figure 11. SO-14 tape and reel information



1. Drawing is not to scale.

Table 9. SO-14 tape and reel information

Ref	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.4		6.6	0.252		0.260
Bo	9		9.2	0.354		0.362
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319

6 Ordering information

Table 10. Order codes

Order code	Temperature range	Package	Packing	Marking
HCF40106M013TR	-55 ° C to +125 ° C	SO-14	Tape & reel	HCF40106
HCF40106YM013TR(1)	-40 ° C to +125 ° C	SO-14 (automotive grade)(1)		HCF40106Y

1. Qualification and characterization according to AEC Q100 and Q003 or equivalent, advanced screening according to AEC Q001 and Q002 or equivalent.

7 Revision history

Table 11. Document revision history

Date	Revision	Changes
19-Feb-2013	3	Document template and layout updated Updated package names (PDIP-14 and SO-14 instead of DIP-14 and SOP-14) Updated *Features* Added *Applications* Updated *Device summary table* Removed “HCC” from *Figure 7*, *Figure 8*, and *Figure 9* Added *Section 6: Ordering information*
06-Jan-2014	4	Removed DIP package option Added ESD performance to *Features* Updated footnote *1* of *Table 1: Device summary table* Updated footnote *1* of *Table 10: Order codes*

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