



DM7520/DM8520 Modulo-N Dividers

General Description

Although extremely versatile in a number of applications, the primary uses of these circuits are in two areas:

1. **MODULO-N DIVIDER**
A single DM7520/DM8520 can be programmed without external components to divide by any number from 2 to 15. Cascading of these dividers will provide division by any number from 2 to very large numbers.
2. **SHIFT REGISTER**
Since the basic organization of the logic is that of a serial shift register, the device may be used where four-bit parallel-in-serial-out shifting is required.

(Continued)

Features

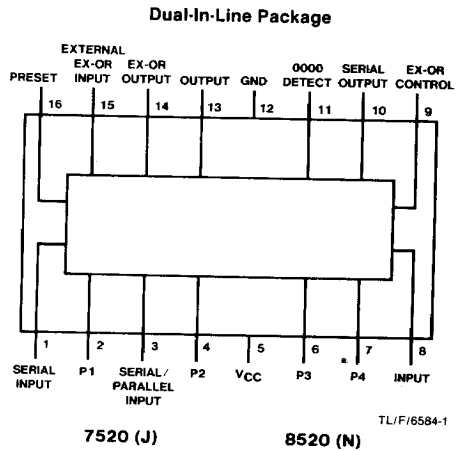
- Fully programmable divider—any number from 2 to ∞
- Also functions as a four-bit parallel shift register
- Typical propagation delay 36 ns
- Typical power dissipation 250 mW

Absolute Maximum Ratings (Note 1)

Supply Voltage	7V
Input Voltage	5.5V
Storage Temperature Range	- 65°C to 150°C

Note 1: The "Absolute Maximum Ratings" are those values beyond which the safety of the device can not be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Connection Diagram



Function Table

Table for Division By N

Setting				÷ BY
P1	P2	P3	P4	
H	H	H	L	2
H	H	L	L	3
H	L	L	L	4
L	L	L	H	5
L	L	H	L	6
L	H	L	L	7
H	L	L	H	8
L	L	H	H	9
L	H	H	L	10
H	H	L	H	11
H	L	H	L	12
L	H	L	H	13
H	L	H	H	14
L	H	H	H	15

General Description (Continued)

Setting				Setting				Setting																			
Divider 1		Divider 2		By	Divider 1		Divider 2		By	Divider 1		Divider 2		By													
P1	P2	P3	P4	P1	P2	P3	P4		P1	P2	P3	P4	P1	P2	P3	P4											
L	H	H	H	H	H	H	H	255	H	L	L	L	H	L	L	H	195	L	L	H	H	H	L	L	H	135	
H	L	H	H	H	H	H	H	254	H	H	L	L	L	H	L	L	H	194	H	L	L	L	H	H	L	L	134
L	L	L	H	H	H	H	H	253	H	H	H	L	L	L	H	L	L	193	L	H	L	H	H	H	H	L	133
L	L	L	H	H	H	H	H	252	L	H	H	H	L	L	L	H	L	192	H	L	H	L	L	H	H	H	132
H	L	L	H	L	H	H	H	251	L	L	H	H	H	L	L	L	H	191	H	H	L	H	L	L	H	H	131
L	L	L	L	H	L	H	H	250	L	L	L	H	H	H	L	L	L	190	L	H	H	L	H	L	L	H	130
L	L	L	L	H	L	H	H	249	H	L	L	L	H	H	H	L	L	189	H	L	H	H	L	H	L	L	129
L	L	L	L	H	L	H	L	248	L	H	L	L	L	L	H	H	H	188	L	H	L	H	H	L	H	L	128
L	L	L	L	H	L	H	L	247	H	L	H	L	L	L	H	H	H	187	H	L	H	L	H	H	L	H	127
L	L	L	L	H	L	H	L	246	H	H	L	H	L	L	L	H	H	186	L	H	L	H	L	H	H	L	126
L	L	L	L	L	L	H	L	245	L	H	H	L	H	L	L	L	L	185	L	L	H	L	H	L	H	H	125
L	L	L	L	L	L	L	H	244	L	L	H	H	L	H	L	L	L	184	H	L	L	H	L	H	L	H	124
H	L	L	L	L	L	L	L	243	H	L	L	H	H	L	H	L	L	183	L	H	L	L	L	H	L	H	123
H	H	L	L	L	L	L	L	242	L	H	L	L	H	H	L	H	L	182	H	L	H	L	L	H	L	H	122
H	H	H	L	L	L	L	L	241	L	L	H	L	L	H	H	L	L	181	H	H	L	H	L	L	H	L	121
L	H	H	H	L	L	L	L	240	H	L	L	H	L	H	H	L	L	180	H	H	L	H	L	L	H	L	120
H	L	H	H	H	L	L	L	239	L	H	L	L	L	H	L	L	H	179	L	H	H	H	L	H	L	H	119
H	H	L	H	H	H	L	L	238	L	L	H	L	L	H	L	L	L	178	H	L	H	H	H	L	H	L	118
L	H	H	L	H	H	H	L	237	H	L	L	H	L	L	H	L	L	177	H	H	L	H	H	H	L	H	117
L	L	H	H	L	H	H	H	236	H	H	L	L	L	H	L	L	H	176	H	H	H	L	H	H	H	L	116
L	L	L	H	H	L	H	H	235	H	H	H	L	L	H	L	L	L	175	H	H	H	H	L	H	H	H	115
L	L	L	L	L	H	H	H	234	L	H	H	H	L	L	H	L	L	174	H	H	H	H	H	L	H	H	114
L	L	L	L	L	H	H	L	233	H	L	H	H	H	L	L	H	L	173	L	H	H	H	H	H	L	H	113
L	L	L	L	L	L	H	H	232	L	H	L	H	H	H	L	L	L	172	H	L	H	H	H	H	H	L	112
H	L	L	L	L	L	H	H	231	H	L	H	L	H	H	H	L	L	171	H	H	L	H	H	H	H	H	111
L	L	L	L	L	L	L	L	230	H	H	L	H	L	H	H	H	L	170	H	H	H	L	H	H	H	H	110
L	L	L	L	L	L	L	L	229	L	H	H	L	L	H	L	H	H	169	L	H	H	H	L	H	H	H	109
H	L	L	L	H	L	L	L	228	H	L	H	H	L	H	L	H	H	168	L	L	H	H	H	L	H	H	108
H	H	L	L	H	L	L	L	227	H	H	L	H	H	L	H	L	H	167	H	L	L	H	H	H	L	H	107
L	H	H	L	L	H	L	L	226	L	H	H	L	L	H	H	L	H	166	H	H	L	L	L	H	H	L	106
H	L	H	H	L	L	H	L	225	H	L	H	H	L	H	H	L	L	165	L	H	H	L	L	H	H	H	105
L	L	H	L	H	H	L	L	224	L	H	L	H	H	L	H	H	H	164	L	L	H	H	L	L	H	H	104
L	L	L	H	L	H	H	L	223	L	L	H	L	H	H	L	H	L	163	L	L	L	H	H	L	L	H	103
L	L	L	L	H	L	H	L	222	H	L	L	H	L	H	H	L	L	162	L	L	L	L	H	H	L	L	102
L	L	L	L	L	H	L	H	221	H	H	L	L	L	H	L	H	H	161	H	L	L	L	L	L	H	L	101
L	L	L	L	L	L	H	L	220	H	H	H	L	L	H	L	H	L	160	H	H	L	L	L	L	H	H	100
H	L	L	L	L	L	H	L	219	H	H	H	H	L	L	H	L	L	159	L	H	H	L	L	L	L	H	99
H	L	L	L	L	L	L	H	218	L	H	H	H	H	L	L	H	L	158	L	L	H	H	L	L	L	L	98
L	H	H	L	L	L	L	L	217	H	L	H	H	H	H	L	L	L	157	H	L	L	H	H	L	L	L	97
H	L	H	H	L	L	L	L	216	H	H	L	H	H	H	H	L	L	156	L	H	L	L	H	H	L	L	96
L	L	L	L	L	L	L	L	215	L	H	H	L	L	H	H	H	H	155	H	L	H	L	L	L	H	L	95
H	L	L	L	L	L	L	L	214	H	L	L	H	H	L	H	H	H	154	L	H	L	H	L	L	H	H	94
H	H	L	L	L	L	L	L	213	H	H	L	H	H	L	H	H	H	153	H	L	H	L	L	L	L	H	93
H	H	H	L	L	L	L	L	212	H	H	H	L	H	H	L	H	L	152	L	H	L	H	L	L	L	L	92
L	H	H	H	L	L	L	L	211	L	H	H	H	L	L	H	L	L	151	L	L	H	L	H	L	L	L	91
L	L	H	H	H	L	L	L	210	H	L	H	H	H	L	H	H	L	150	L	L	L	H	L	L	L	H	90
L	L	L	L	H	H	L	L	209	L	H	L	H	H	H	L	L	H	149	H	L	L	L	L	H	L	H	89
L	L	L	L	L	H	H	L	208	L	L	H	L	L	H	H	H	L	148	L	H	L	L	L	L	H	L	88
H	L	L	L	L	H	H	H	207	L	L	L	H	L	H	H	H	L	147	H	L	H	L	L	L	H	L	87
L	H	L	L	L	L	H	H	206	H	L	L	L	L	L	H	H	L	146	L	H	L	H	L	L	L	H	86
H	L	H	L	L	L	L	H	205	H	H	L	L	L	L	H	L	H	L	145	H	L	H	L	L	L	L	85
H	H	L	L	L	L	L	L	204	L	H	H	L	L	L	L	H	L	144	H	H	L	H	L	L	L	L	84
H	H	H	L	L	L	L	L	203	H	L	H	H	L	L	L	L	H	143	H	H	H	L	L	L	L	L	83
H	H	H	H	L	L	L	L	202	H	H	L	H	H	L	L	L	L	142	H	H	H	H	L	L	L	L	82
L	H	H	H	H	L	L	L	201	L	H	H	L	L	L	L	L	L	141	H	H	H	H	H	L	L	L	81
L	L	H	H	H	H	L	L	200	L	L	H	H	L	L	L	L	L	140	H	H	H	H	H	H	L	H	80
H	L	L	L	H	H	H	L	199	H	L	L	H	L	L	H	L	L	139	L	H	H	H	H	H	H	L	79
L	L	L	L	L	H	H	H	198	H	H	L	L	L	L	H	L	L	138	L	L	H	H	H	H	H	H	78
L	L	L	L	L	L	H	H	197	H	H	L	L	L	L	L	L	L	137	H	L	L	H	H	H	H	H	77
L	L	L	L	L	L	H	H	196	L	H	H	H	L	L	L	H	L	136	H	H	L	L	L	H	H	H	76

FIGURE 2. DM7520/DM8520 Shift Register Divider Input Coding Table (2 Package Combinations)

General Description (Continued)

Setting										Setting										Setting									
Divider 1				Divider 2				By	Divider 1				Divider 2				By	Divider 1				Divider 2				By			
P1	P2	P3	P4	P1	P2	P3	P4		P1	P2	P3	P4	P1	P2	P3	P4		P1	P2	P3	P4	P1	P2	P3	P4				
H	H	H	L	L	H	H	H	75	L	L	H	H	H	H	L	L	50	L	H	H	L	L	H	H	L	25			
H	H	H	H	L	L	H	H	74	L	L	L	H	H	H	H	L	49	H	L	H	H	L	L	H	H	24			
H	H	H	H	H	L	L	H	73	H	L	L	L	H	H	H	H	48	H	H	L	H	H	L	L	H	23			
L	H	H	H	H	H	L	L	72	H	H	L	L	L	H	H	H	47	H	H	H	L	H	H	L	L	22			
L	L	H	H	H	H	H	L	71	L	H	H	L	L	L	H	H	46	H	H	H	H	L	H	H	L	21			
L	L	L	H	H	H	H	H	70	L	L	H	H	L	L	L	H	45	L	H	H	H	H	L	H	H	20			
L	L	L	L	H	H	H	H	69	L	L	L	H	H	L	L	L	44	H	L	H	H	H	H	L	H	19			
L	L	L	L	L	H	H	H	68	H	L	L	L	H	H	L	L	43	L	H	L	H	H	H	H	L	18			
H	L	L	L	L	L	H	H	67	L	H	L	L	L	H	H	L	42	H	L	H	L	H	H	H	H	17			
L	H	L	L	L	L	L	H	66	L	L	H	L	L	L	H	H	41	L	H	L	H	L	H	H	H	16			
H	L	H	L	L	L	L	L	65	L	L	L	H	L	L	L	H	40	H	L	H	L	H	L	H	H	15			
L	H	L	H	L	L	L	L	64	H	L	L	L	H	L	L	L	39	L	H	L	H	L	H	L	H	14			
L	L	H	L	H	L	L	L	63	L	H	L	L	L	H	L	L	38	H	L	H	L	H	L	H	L	13			
L	L	L	H	L	H	L	L	62	L	L	H	L	L	L	H	L	37	H	H	L	H	L	H	L	H	12			
L	L	L	L	H	L	H	L	61	H	L	L	H	L	L	L	H	36	L	H	H	L	H	L	H	L	11			
H	L	L	L	L	H	L	H	60	L	H	L	L	H	L	L	L	35	L	L	H	H	L	H	L	H	10			
L	H	L	L	L	L	H	L	59	H	L	H	L	L	H	L	L	34	L	L	L	H	H	L	H	L	9			
L	L	H	L	L	L	L	H	58	L	H	L	H	L	L	H	L	33	H	L	L	L	H	H	L	H	8			
L	L	L	H	L	L	L	L	57	L	L	H	L	L	L	H	L	32	H	H	L	L	L	H	H	L	7			
L	L	L	L	H	L	L	L	56	H	L	L	H	L	H	L	L	31	H	H	H	L	L	L	H	H	6			
H	L	L	L	L	H	L	L	55	H	H	L	L	H	L	H	L	30	H	H	H	H	L	L	L	H	5			
H	H	L	L	L	L	H	L	54	L	H	H	L	L	H	L	H	29	H	H	H	H	H	L	L	L	4			
H	H	H	L	L	L	L	H	53	L	L	H	H	L	L	H	L	28	H	H	H	H	H	H	L	L	3			
H	H	H	H	L	L	L	L	52	H	L	L	H	H	L	L	H	27	H	H	H	H	H	H	H	L	2			
L	H	H	H	H	L	L	L	51	H	H	L	L	H	H	L	L	26												

FIGURE 2. DM7520/DM8520 Shift Register Divider Input Coding Table (2 Package Combinations)

Recommended Operating Conditions

Symbol	Parameter	DM7520			DM8520			Units
		Min	Nom	Max	Min	Nom	Max	
V _{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V _{IH}	High Level Input Voltage	2			2			V
V _{IL}	Low Level Input Voltage			0.8			0.8	V
I _{OH}	High Level Output Current			-0.4			-0.4	mA
I _{OL}	Low Level Output Current			16			16	mA
f _{CLK}	Clock Frequency	0		15	0		15	MHz
T _A	Free Air Operating Temperature	-55		125	0		70	°C

Electrical Characteristics over recommended operating free air temperature (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V _I	Input Clamp Voltage	V _{CC} = Min, I _I = -12 mA			-1.5	V
V _{OH}	High Level Output Voltage	V _{CC} = Min, I _{OH} = Max V _{IL} = Max, V _{IH} = Min	2.4			V
V _{OL}	Low Level Output Voltage	V _{CC} = Min, I _{OL} = Max V _{IH} = Min, V _{IL} = Max			0.4	V
I _I	Input Current @ Max Input Voltage	V _{CC} = Max, V _I = 5.5V			1	mA
I _{IH}	High Level Input Current	V _{CC} = Max V _I = 2.4V	EX-OR		80	μA
			Other		40	
I _{IL}	Low Level Input Current	V _{CC} = Max V _I = 0.4V	EX-OR		-3.2	mA
			Other		-1.6	
I _{OS}	Short Circuit Output Current	V _{CC} = Max (Note 2)	DM75	-20	-55	mA
			DM85	-18	-55	
I _{CC}	Supply Current	V _{CC} = Max		50	.75	mA

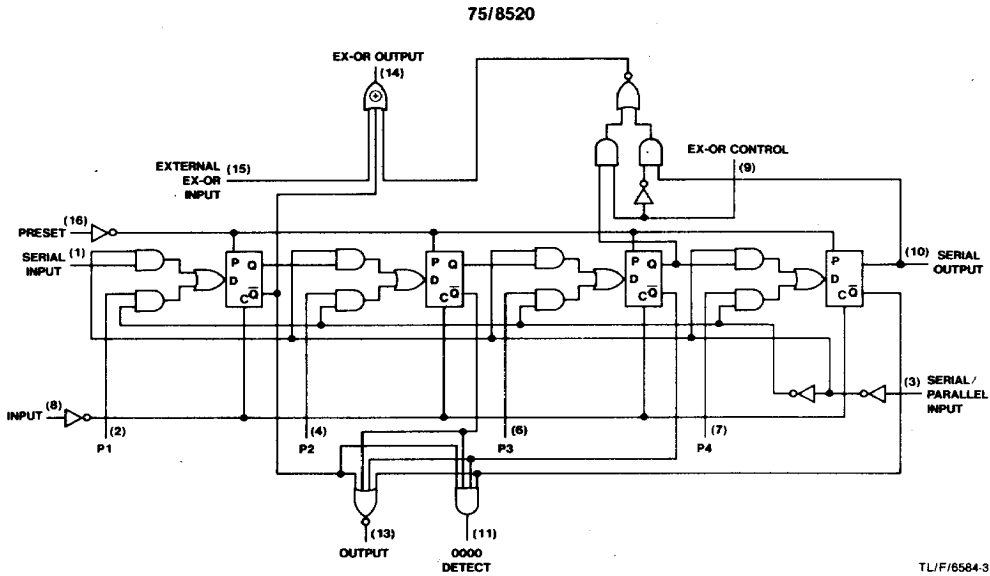
Switching Characteristics at V_{CC} = 5V and T_A = 25°C (See Section 1 for Test Waveforms and Output Load)

Parameter	Conditions	C _L = 15 pF R _L = 100Ω			Units
		Min	Typ	Max	
f _{MAX} Maximum Clock Frequency		15	20		MHz
t _{PLH} Propagation Delay Time Low to High Level Output			35	50	ns
t _{PHL} Propagation Delay Time High to Low Level Output			38	55	ns

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: Not more than one output should be shorted at a time.

Logic Diagram



TL/F/6584-3