Low-Power, Monolithic, CMOS Analog Multiplexers

ABSOLUTE MAXIMUM RATINGS

V+ to GND .... +18V
V- to GND .... -18V
V Between Any Switch Terminals (Note 1) 25V
Digital Input Voltage Range .... V+ to GND
Max Overvoltage at VOUT (V$_S$) .... V-, V+
Switch Current (I$_S$, Continuous 1 Channel) 20mA
Switch Current (I$_S$, Surge 1 Channel,
  1ms Duration, 10% Duty Cycle) 35mA

Power Dissipation (Any Package)
  Up to +50°C 1000mW
  Derate above +50°C by .... 10mW/°C
Operating Temperature
  MX750_JN/KN/C/D .... 0°C to +70°C
  MX750_JQ/KQ .... -40°C to +85°C
  MX750_SQ/SE .... -55°C to +125°C
Storage Temperature .... -65°C to +150°C

Note 1: Do not apply voltages higher than V+ and V- to any other terminal, especially when V- = V+ = 0V, all other pins should be at 0V.

Note 2: The digital control inputs are diode protected; however, permanent damage may occur on unconnected units under high-energy electrostatic fields. Keep unused units in conductive foam at all times.

Stresses listed under "Absolute Maximum Ratings" may be applied (one at a time) to devices without resulting in permanent damage. 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+ = +15V, V- = -15V, GND = 0V, unless otherwise noted.)

PARAMETER		SYMBOL	VERSION (Note 3)	SWITCH CONDITION	TEST CONDITIONS	+25°C MIN	+25°C TYP	+25°C MAX	OVER SPECIFIED TEMP. RANGE MIN	OVER SPECIFIED TEMP. RANGE TYP	OVER SPECIFIED TEMP. RANGE MAX	UNITS
ANALOG SWITCH												
Drain-Source On Resistance		r$_{DS(ON)}$	J, K, S	On	V$_S$ = ±10V, I$_S$ = 1mA	180	300				450	Ω
		r$_{DS(ON)}$ vs. V$_S$	All	On	V$_S$ = ±10V, I$_S$ = 1mA		15					%
Tempco of On Resistance		r$_{DS(ON)}$ vs. Temp.	All	On	V$_S$ = 0V, I$_S$ = 1mA					0.5		%/°C
Difference in On Resistance Between Channels		Δr$_{DS(ON)}$ Between Switches	All	On	V$_S$ = 0V, I$_S$ = 1mA		4					%
		Δr$_{DS(ON)}$ vs. Temp. Between Switches	All	On	V$_S$ = 0V, I$_S$ = 1mA					0.05		%/°C
Source-Off Leakage Current		I$_{S(OFF)}$	J, K	Off	V$_S$ = -10V, V$_D$ = +10V and V$_S$ = +10V, V$_D$ = -10V "Enable Low"	±0.2	2				±50	nA
			S	Off			±0.5				±50	
Drain-Off Leakage Current	MX7501 MX7503	I$_{D(OFF)}$	J, K	Off	V$_S$ = -10V, V$_D$ = +10V and V$_S$ = +10V, V$_D$ = -10V "Enable Low"		±10				±250	nA
			S	Off			±5				±250	
	MX7502		J, K	Off			±5				±125	
			S	Off			±3				±125	
Channel-On Leakage Current I$_{D(ON)}$-I$_S$ (Any Switch On)	MX7501 MX7503	I$_{D(ON)}$	J, K	On	V$_S$ = 0		±12				±300	nA
			S	On	V$_S$ = 0		±5.5				±300	
	MX7502		J, K	On	V$_S$ = 0		±7				±175	
			S	On	V$_S$ = 0		±3.5				±175	

MAXIM

ELECTRICAL CHARACTERISTICS (continued)

(V+ = +15V, V- = -15V, GND = 0V, unless otherwise noted.)

PARAMETER	SYMBOL	VERSION (Note 3)	SWITCH CONDITION	TEST CONDITIONS	+25°C			OVER SPECIFIED TEMP. RANGE			UNITS
					MIN	TYP	MAX	MIN	TYP	MAX	
DIGITAL CONTROL											
Address-Input Threshold (Low)	V_{INL}	All								0.8	V
Address-Input Threshold (High)	V_{INH}	J		(Note 4)				3.0			V
		K, S		(Note 4)				2.4			
Input Logic Current	I_{INL} or I_{INH}	All				0.1	10		0.1	30	μA
Address-Input Capacitance	C_{IN}	All				3			3		pF
DYNAMIC CHARACTERISTICS (Note 5)											
Switching Time of Multiplexers (Figure 1)	$t_{TRANSITION}$	All	Off	V_{IN} = 0V to 5V		700	1000			1500	ns
Break-Before-Make Interval (Figure 2)	t_{OPEN}	All	Off	V_{IN} = 0V to 5V		100			100		ns
Enable Turn-On Time (Figure 3)	t_{ON} (EN)	All	On	V_{EN} = 0V to 5V		0.8	1.5			2.0	μs
Enable Turn-Off Time (Figure 3)	t_{OFF} (EN)	All	Off	V_{EN} = 0V to 5V		0.8	1			1.5	μs
Off Isolation	OIRR	All	Off	V_{EN} = 0, R_L = 200Ω, C_L = 3pF, V_S = 3V$_{RMS}$, f = 50kHz		70			70		dB
Source-Off Capacitance	$C_{S(OFF)}$	All	Off			5					pF
Drain-Off Capacitance	$C_{D(OFF)}$	MX7501 MX7503	Off			40					pF
		MX7502	Off			20					
Source-to-Drain Capacitance	C_{S-D}	All	Off			0.5					pF

Note 3: JN/KN versions specified for 0°C to +70°C; JQ/KQ versions for -40°C to +85°C; SQ/SE versions for -55°C to +125°C.
Note 4: A pull-up resistor, typically 1-2kΩ is required to make the J version compatible with TTL/DTL. The maximum value is determined by the output leakage current of the driver gate when in the high state.
Note 5: AC parameters are sample tested to ensure conformance to specifications.

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ELECTRICAL CHARACTERISTICS (continued)
(V+ = +15V, V- = -15V, GND = 0V, unless otherwise noted.)

PARAMETER	SYMBOL	VERSION (Note 3)	SWITCH CONDITION	TEST CONDITIONS	+25˚C			OVER SPECIFIED TEMP. RANGE			UNITS
					MIN	TYP	MAX	MIN	TYP	MAX	
POWER SUPPLY											
Positive Supply Current	I+	All	Off	Digital Inputs = 0V		0.05	0.1			0.2	mA
Negative Supply Current	I-	All	Off	Digital Inputs = 0V		0.05	0.1			0.2	mA
Positive Supply Current	I+	All	On	Digital Inputs = 5V		0.15	0.3			0.5	mA
Negative Supply Current	I-	All	On	Digital Inputs = 5V		0.05	0.1			0.2	mA
Power-Supply Range for Continuous Operation	V_{OP}	All		(Note 6)	±4.5		±18				V

Note 3: JN/KN versions specified for 0˚C to +70˚C; JQ/KQ versions for -40˚C to +85˚C; SQ/SE versions for -55˚C to +125˚C.
Note 4: A pull-up resistor, typically 1-2kΩ is required to make the J version compatible with TTL/DTL. The maximum value is determined by the output leakage current of the driver gate when in the high state.
Note 5: AC parameters are sample tested to ensure conformance to specifications.
Note 6: Guaranteed, but not tested. Electrical Characteristics will change when power supplies other than ±15V are used.
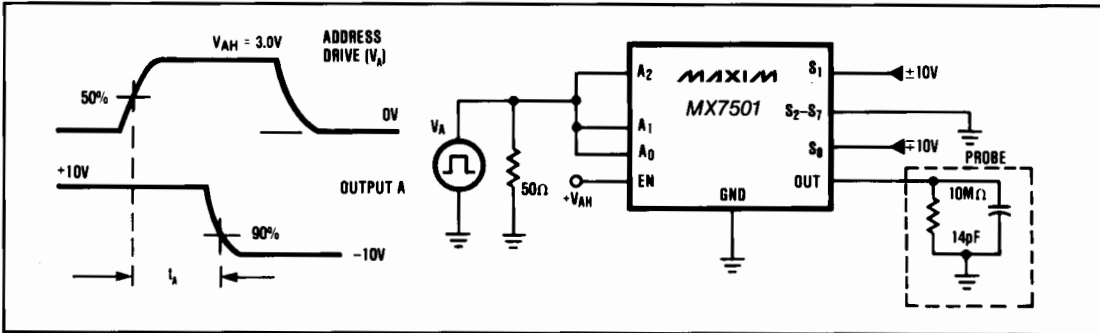

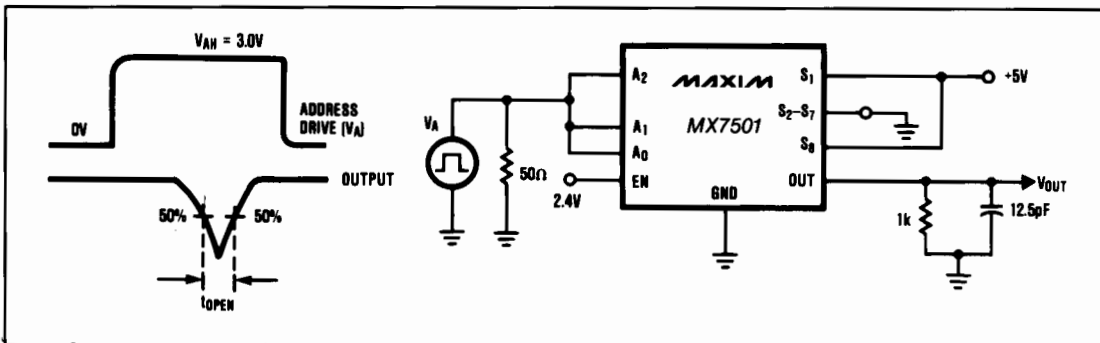Figure 1. Transition Time vs. Logic Level (High)

Figure 2. Break-Before-Make Interval (t_{OPEN})

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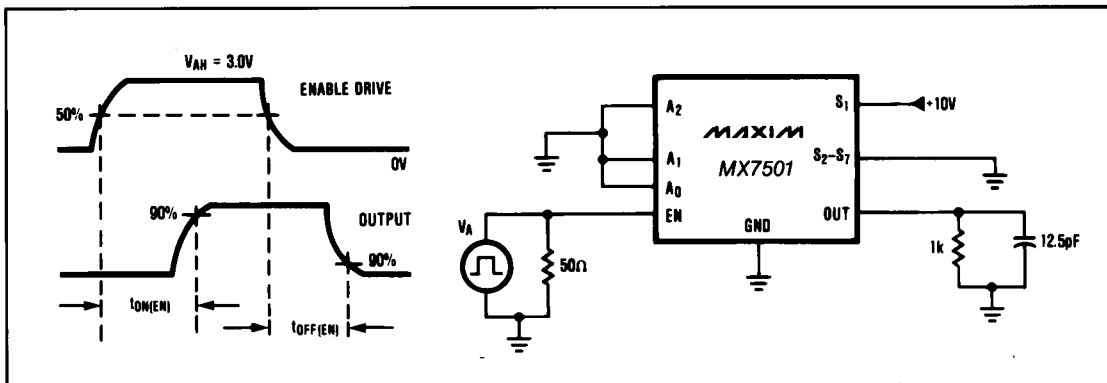
Figure 3. Enable Turn-On/Turn-Off Time

TRUTH TABLES

MX7501				
A2	A1	A0	EN	"ON"
0	0	0	1	1
0	0	1	1	2
0	1	0	1	3
0	1	1	1	4
1	0	0	1	5
1	0	1	1	6
1	1	0	1	7
1	1	1	1	8
X	X	X	0	None

MX7502			
A1	A0	EN	"ON"
0	0	1	1 & 5
0	1	1	2 & 6
1	0	1	3 & 7
1	1	1	4 & 8
X	X	0	None

MX7503				
A2	A1	A0	EN	"ON"
0	0	0	0	1
0	0	1	0	2
0	1	0	0	3
0	1	1	0	4
1	0	0	0	5
1	0	1	0	6
1	1	0	0	7
1	1	1	0	8
X	X	X	1	None

Pin Configurations (continued)

LCC

LCC
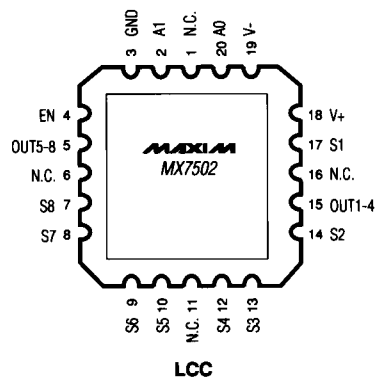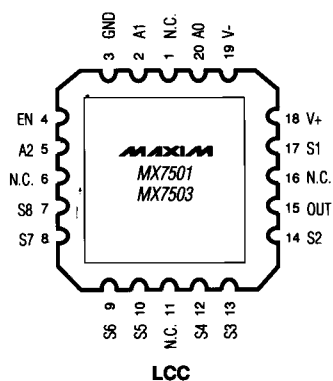
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_____ Chip Topographies

MX7501

_ Ordering Information (continued)
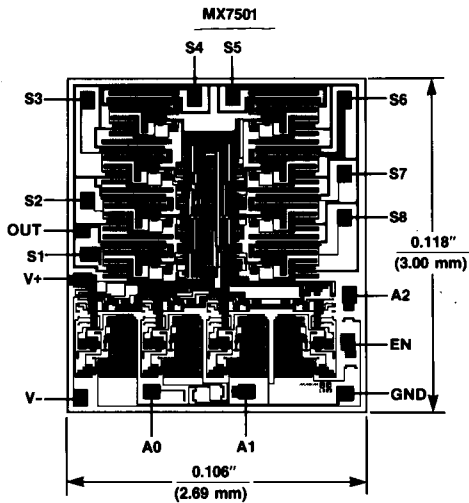
PART	TEMP. RANGE	PIN-PACKAGE
MX7502JN	0°C to +70°C	16 Plastic DIP
MX7502KN	0°C to +70°C	16 Plastic DIP
MX7502C/D*	0°C to +70°C	Dice
MX7502JQ	-40°C to +85°C	16 CERDIP
MX7502KQ	-40°C to +85°C	16 CERDIP
MX7502SQ	-55°C to +125°C	16 CERDIP
MX7502SE*	-55°C to +125°C	20 LCC
MX7503JN	0°C to +70°C	16 Plastic DIP
MX7503KN	0°C to +70°C	16 Plastic DIP
MX7503C/D*	0°C to +70°C	Dice
MX7503JQ	-40°C to +85°C	16 CERDIP
MX7503KQ	-40°C to +85°C	16 CERDIP
MX7503SQ	-55°C to +125°C	16 CERDIP
MX7503SE*	-55°C to +125°C	20 LCC

* For Dice, Plastic Leadless Chip Carrier (PLCC), Ceramic Leadless Chip Carrier (LCC) and Ceramic Sidebraze (Ceramic SB), contact factory for availability.
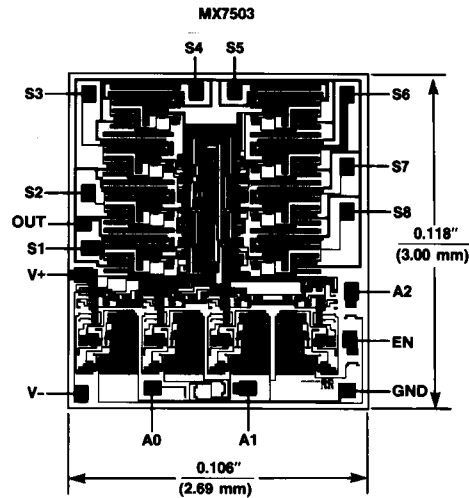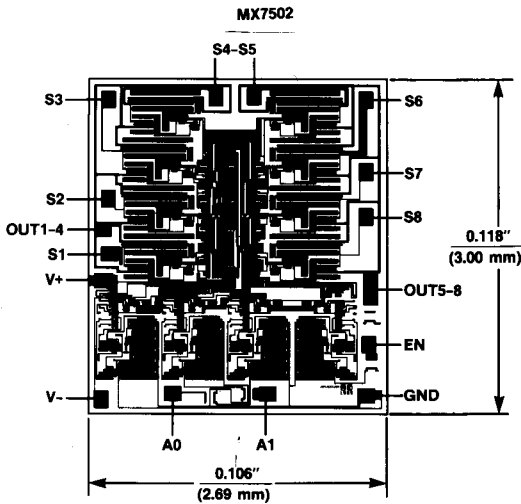
MX7502

MX7503

/M/XI/M

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Package Information

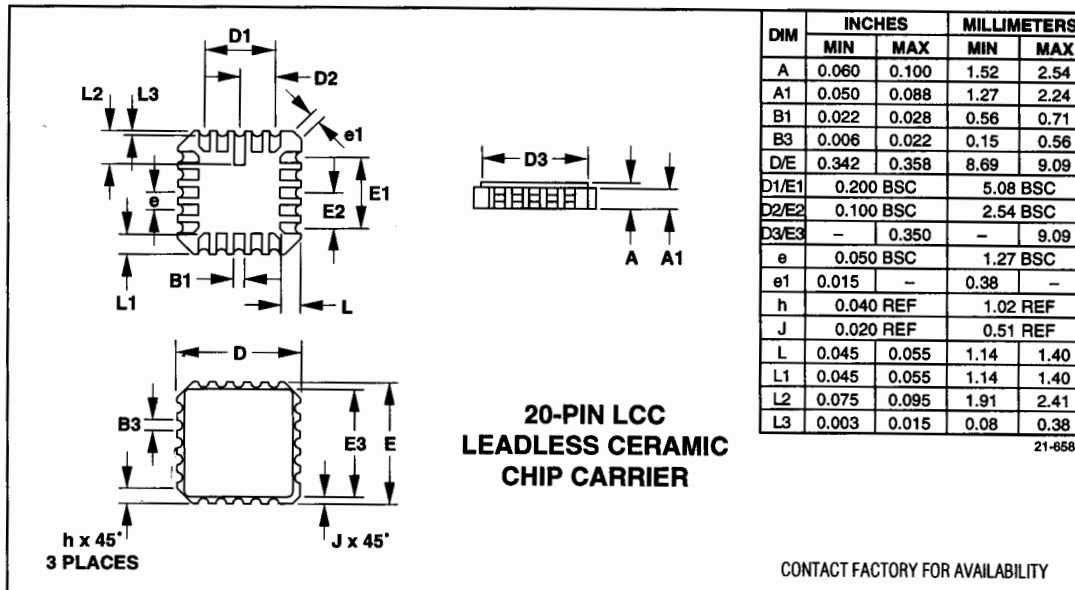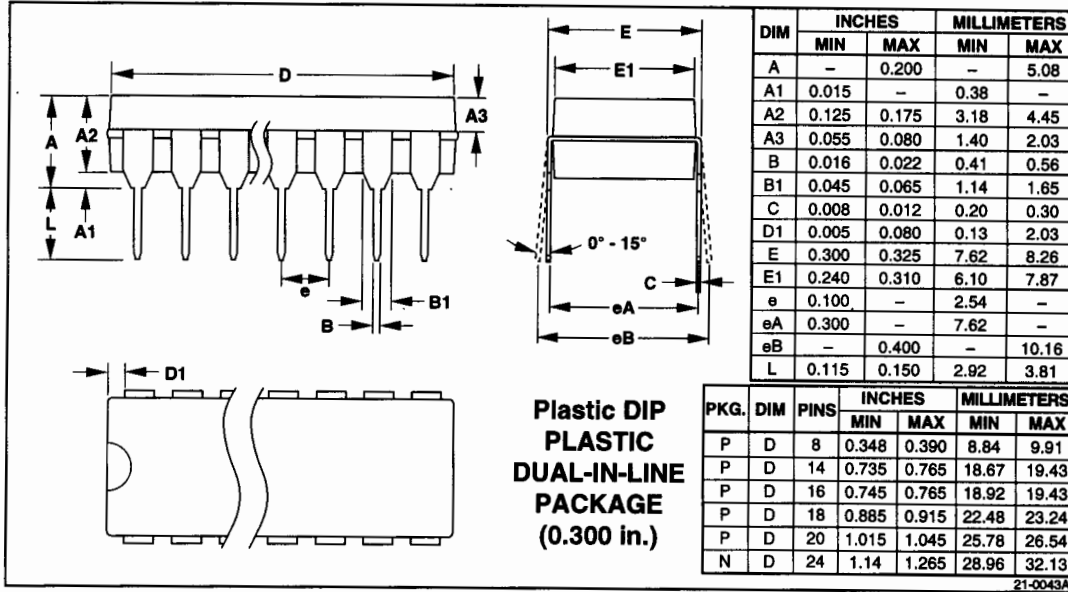| DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	–	0.200	–	5.08
A1	0.015	–	0.38	–
A2	0.125	0.175	3.18	4.45
A3	0.055	0.080	1.40	2.03
B	0.016	0.022	0.41	0.56
B1	0.045	0.065	1.14	1.65
C	0.008	0.012	0.20	0.30
D1	0.005	0.080	0.13	2.03
E	0.300	0.325	7.62	8.26
E1	0.240	0.310	6.10	7.87
e	0.100	–	2.54	–
eA	0.300	–	7.62	–
eB	–	0.400	–	10.16
L	0.115	0.150	2.92	3.81

PKG.	DIM	PINS	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
P	D	8	0.348	0.390	8.84	9.91
P	D	14	0.735	0.765	18.67	19.43
P	D	16	0.745	0.765	18.92	19.43
P	D	18	0.885	0.915	22.48	23.24
P	D	20	1.015	1.045	25.78	26.54
N	D	24	1.14	1.265	28.96	32.13

**Plastic DIP
PLASTIC
DUAL-IN-LINE
PACKAGE
(0.300 in.)**

21-0043A

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.060	0.100	1.52	2.54
A1	0.050	0.088	1.27	2.24
B1	0.022	0.028	0.56	0.71
B3	0.006	0.022	0.15	0.56
D/E	0.342	0.358	8.69	9.09
D1/E1	0.200 BSC		5.08 BSC	
D2/E2	0.100 BSC		2.54 BSC	
D3/E3	–	0.350	–	9.09
e	0.050 BSC		1.27 BSC	
e1	0.015	–	0.38	–
h	0.040 REF		1.02 REF	
J	0.020 REF		0.51 REF	
L	0.045	0.055	1.14	1.40
L1	0.045	0.055	1.14	1.40
L2	0.075	0.095	1.91	2.41
L3	0.003	0.015	0.08	0.38

21-658A

**20-PIN LCC
LEADLESS CERAMIC
CHIP CARRIER**

h x 45°
3 PLACES

J x 45°

CONTACT FACTORY FOR AVAILABILITY

MAXIM

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Low-Power,
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Package Information (continued)

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	–	0.200	–	5.08
B	0.014	0.023	0.36	0.58
B1	0.038	0.065	0.97	1.65
C	0.008	0.015	0.20	0.38
E	0.220	0.310	5.59	7.87
E1	0.290	0.320	7.37	8.13
e	0.100		2.54	
L	0.125	0.200	3.18	5.08
L1	0.150	–	3.81	–
Q	0.015	0.070	0.38	1.78
S	–	0.098	–	2.49
S1	0.005	–	0.13	–

CERDIP
CERAMIC DUAL-IN-LINE
PACKAGE
(0.300 in.)

DIM	PINS	INCHES		MILLIMETERS	
		MIN	MAX	MIN	MAX
D	8	–	0.405	–	10.29
D	14	–	0.785	–	19.94
D	16	–	0.840	–	21.34
D	18	–	0.960	–	24.38
D	20	–	1.060	–	26.92
D	24	–	1.280	–	32.51

21-0045A

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