



THE DATASHEET OF
2N5445

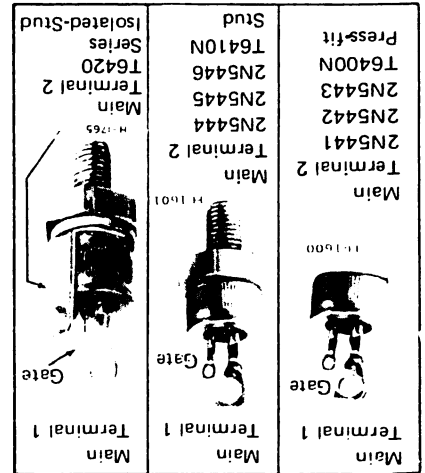


Thyristors

2N5441 2N5442 2N5443

2N5444 2N5445 2N5446

T6400 T6410 T6420 Series



40-A Silicon Triacs

Press-Fit, Stud, and Isolated-Stud Packages

For 120-V Line Operation . . . 2N5441, 2N5444, T6420B
 For 240-V Line Operation . . . 2N5442, 2N5445, T6420D
 For High-Voltage Operation . . . 2N5443, 2N5446, T6420M
 T6400N, T6410N, T6420N

- Low On-State Voltage at High Current Levels
- Low Thermal Resistance
- Low Switching Losses
- Shorted-Emitter, Center-Gate Design

Features:

Triacs are gate-controlled, full-wave silicon ac switches. They are designed to switch from an off-state to an on-state for either polarity of applied voltage with positive or negative gate-triggering voltages.

MAXIMUM RATINGS, Absolute-Maximum Values:
 For Operation with Sinusoidal Supply Voltage at Frequencies up to 50/60 Hz and with Resistive or Inductive Load.

2N5441	2N5442	2N5443	T6400N
2N5444	2N5445	2N5446	T6410N
T6420B	T6420D	T6420M	T6420N

• **REPETITIVE PEAK OFF-STATE VOLTAGE:**
 Gate open, $T_J = -65$ to 110°C
 RMS ON-STATE CURRENT (Conduction angle = 360°):
 Case temperature
 $T_C = 70^\circ\text{C}$ (Press-fit types)
 $= 65^\circ\text{C}$ (Stud types)
 $= 60^\circ\text{C}$ (Isolated-stud types)
 For other conditions
PEAK SURGE (NON-REPETITIVE) ON-STATE CURRENT:
 For one cycle of applied principal voltage
 60 Hz (sinusoidal)
 50 Hz (sinusoidal)
 For more than one cycle of applied principal voltage
RATE OF CHANGE OF ON-STATE CURRENT:
 $V_{DM} = V_{DROM}$, $I_{GT} = 200\text{ mA}$, $t_r = 0.1\ \mu\text{s}$ (See Fig. 13)
FUSING CURRENT (for Triac Protection):
 $T_J = -65$ to 110°C , $t = 1.25$ to 10 ms
PEAK GATE-TRIGGER CURRENT:
 For $1\ \mu\text{s}$ max., See Fig. 7
GATE POWER DISSIPATION:
 PEAK (For $10\ \mu\text{s}$ max., $I_{GTM} \leq 4\text{ A}$, See Fig. 7)
 AVERAGE
TEMPERATURE RANGE:
 Storage
 Operating (Case)
TERMINAL TEMPERATURE (During soldering):
 For 10 s max. (terminals and case)

40	40	40	40	225
A	A	A	A	$^\circ\text{C}$
40	40	40	40	265
A	A	A	A	$^\circ\text{C}$
40	40	40	40	300
A	A	A	A	$^\circ\text{C}$
40	40	40	40	350
A	A	A	A	$^\circ\text{C}$
100	100	100	100	350
A/ μs	A/ μs	A/ μs	A/ μs	$^\circ\text{C}$
12	12	12	12	40
A	A	A	A	W
40	40	40	40	0.75
W	W	W	W	W
225	225	225	225	$^\circ\text{C}$

• In accordance with JEDEC registration data format (JES-14, RFP2) filed for the JEDEC (2N-Series) types
 • For either polarity of gate voltage (V_G) with reference to main terminal 1
 • For either polarity of main terminal 2 voltage (V_{MT2}) with reference to main terminal 1
 • For temperature measurement reference point, see Dimensional Outline

ELECTRICAL CHARACTERISTICS

At Maximum Ratings Unless Otherwise Specified and at Indicated Case Temperature (T_C)

CHARACTERISTIC	SYMBOL	LIMITS			UNITS
		FOR ALL TYPES UNLESS OTHERWISE SPECIFIED			
		MIN.	TYP.	MAX.	
Peak Off-State Current: Gate open, T _J = 110°C, V _{DROM} = Max. rated value	I _{DROM}	—	0.2	4*	mA
Maximum On-State Voltage: For I _T = 100 A (peak), T _C = 25°C; For I _T = 56 A (peak), T _C = 25°C	V _{TM}	—	1.7	2	V
DC Holding Current: Gate open, initial principal current = 500 mA (dc), V _D = 12V; T _C = 25°C; T _C = -65°C; For other case temperatures	I _{HO}	—	25	60	mA
Critical Rate of Rise of Commutation Voltage: For V _D = V _{DROM} , I _T (RMS) = 40 A, commutating di/dt = 22 A/ms, gate unenergized, (See Fig. 14); T _C = 70°C (Press-fit types); T _C = 65°C (Stud types); T _C = 60°C (Isolated-stud types)	dv/dt	5*	30	30	V/μs
Critical Rate of Rise of Off-State Voltage: For V _D = V _{DROM} , exponential voltage rise, gate open, T _C = 110°C; 2N5441, 2N5444, T6420B, 2N5442, 2N5445, T6420D, 2N5443, 2N5446, T6420M, T6420N, T6420N, T6420N, T6420N	dv/dt	50*	30*	200	V/μs
DC Gate-Trigger Current: Mode V _{MT2} V _G positive; Mode V _{MT2} V _G negative; For V _D = 12 V (dc), R _L = 30 Ω, T _C = 25°C; Mode V _{MT2} V _G positive; Mode V _{MT2} V _G negative; For other case temperatures	I _{GT}	—	15	50	mA
DC Gate-Trigger Voltage: For V _D = 12 V (dc), R _L = 30 Ω, T _C = 25°C; For other case temperatures	V _{GT}	—	1.35	2.5	V
Gate-Controlled Turn-On Time: (Delay Time + Rise Time) For V _D = V _{DROM} , I _{GT} = 200 mA, I _T = 0.1 μs, I _T = 60 A (peak), T _C = 25°C (See Figs. 11 & 15)	t _{gt}	—	1.7	3	μs
Thermal Resistance, Junction-to-Case: Steady-State; Press-fit types; Stud types; Isolated-stud types; Transient (Press-fit & stud types)	R _{θJC}	—	—	—	°C/W

* In accordance with JEDEC registration data format (JES-14, RDF 2) filed for the JEDEC (2N-Series) types.

♦ For either polarity of main terminal 2 voltage (V_{MT2}) with reference to main terminal 1.

♦ For either polarity of gate voltage (V_G) with reference to main terminal 1.

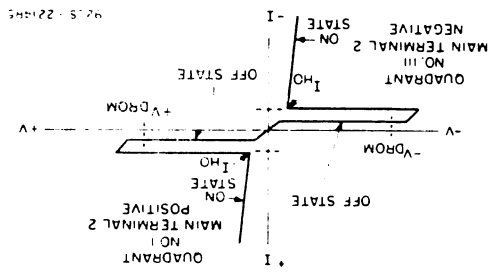


Fig. 1—Principal voltage-current characteristic.

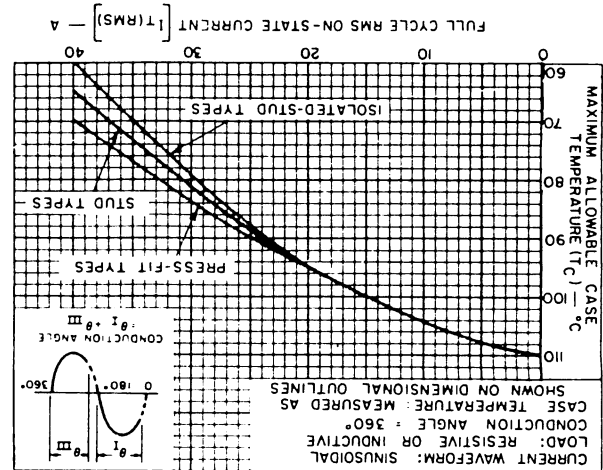


Fig. 3—Maximum allowable case temperature vs. on-state current.

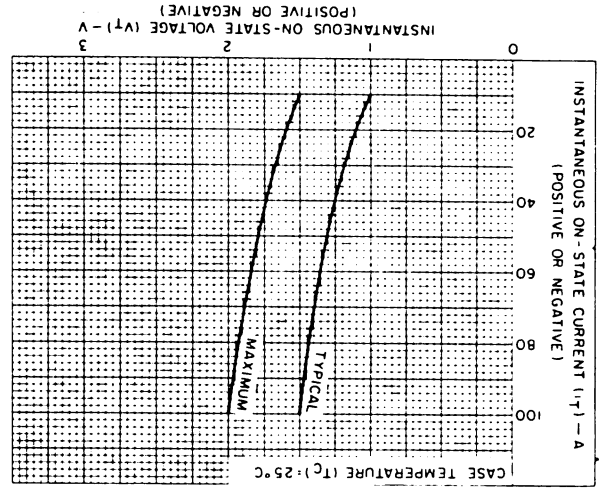


Fig. 5—On-state current vs. on-state voltage.

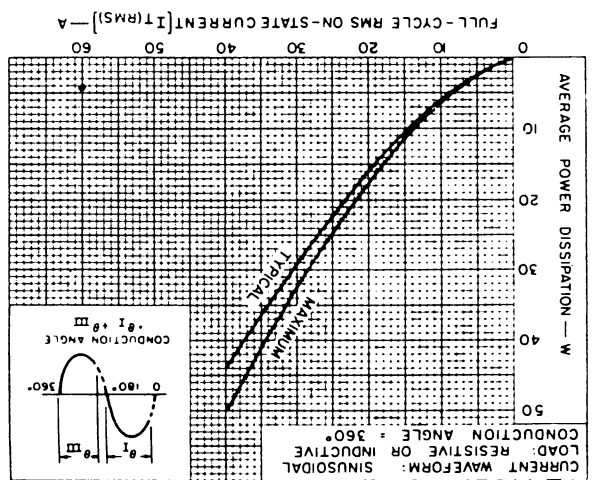


Fig. 2—Power dissipation vs. on-state current.

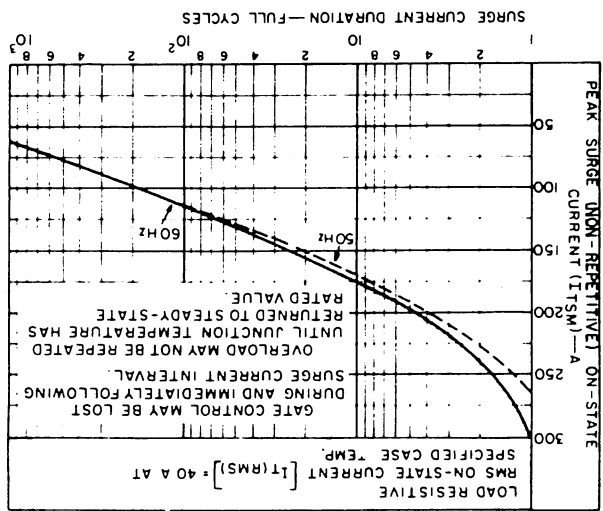


Fig. 4—Peak surge on-state current vs. surge current duration.

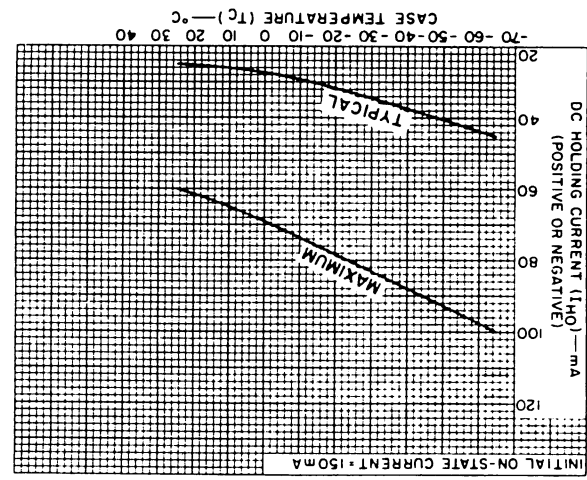


Fig. 6—DC holding current vs. case temperature.

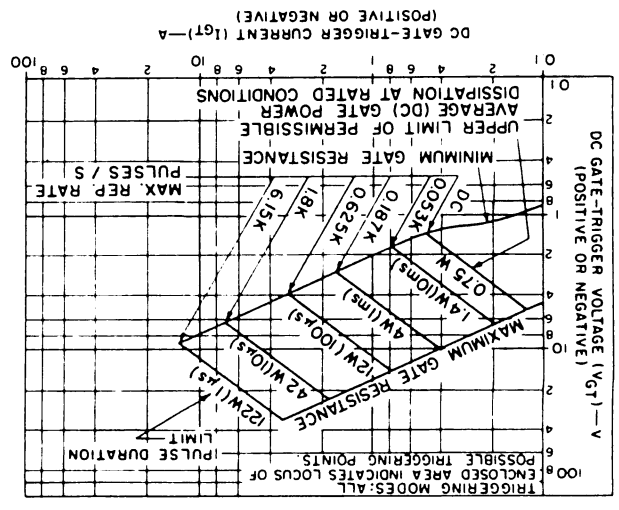


Fig. 7—Gate-trigger characteristics and limiting conditions for determination of permissible gate-trigger pulses.

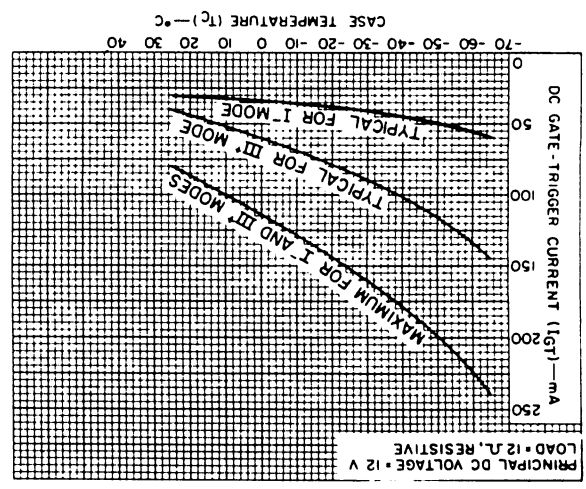


Fig. 9—DC gate-trigger current vs. case temperature (I & III modes).

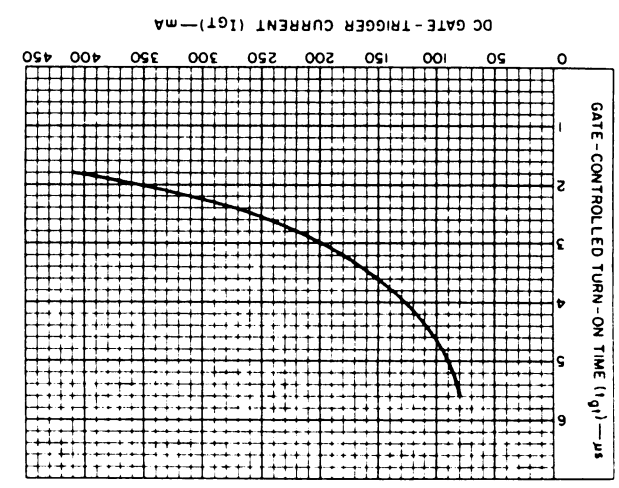


Fig. 11—Turn-on time vs. gate-trigger current.

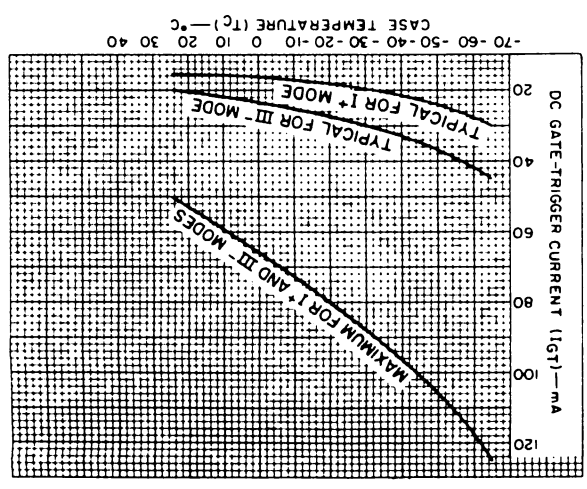


Fig. 8—DC gate-trigger current vs. case temperature (I* & III* modes).

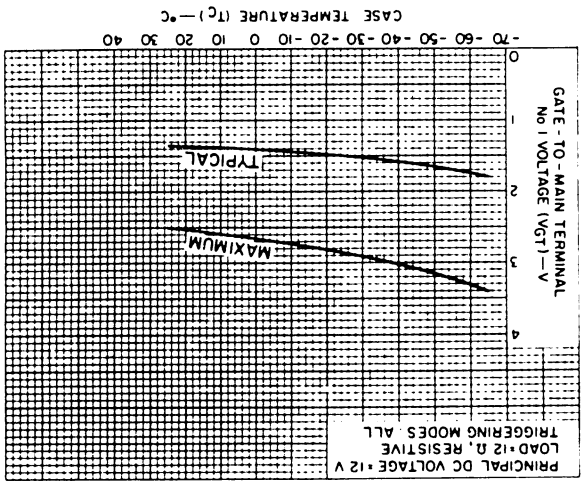


Fig. 10—DC gate-trigger voltage vs. case temperature.

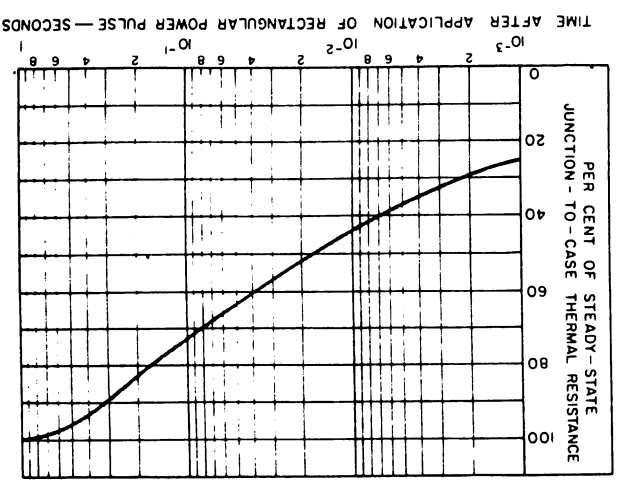
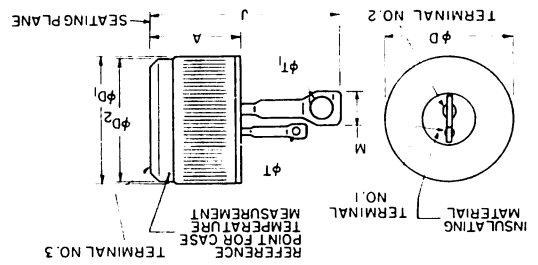
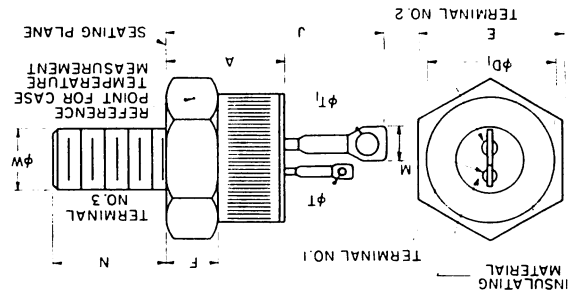


Fig. 12—Transient junction-to-case thermal resistance vs. time for press-fit and stud types.

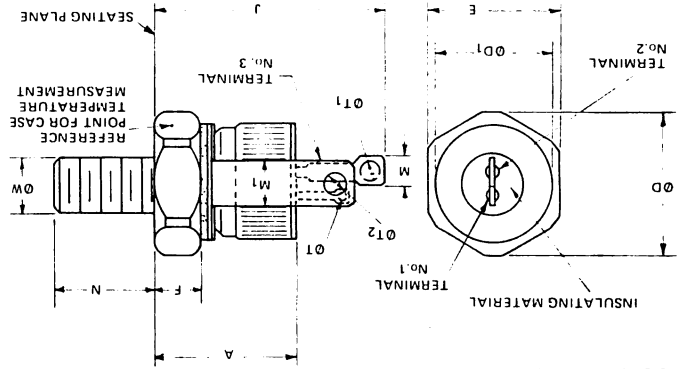
DIMENSIONAL OUTLINE FOR TYPES
2N5441, 2N5442, 2N5443, T6400N
PRESS-FIT



DIMENSIONAL OUTLINE FOR TYPES
2N5444, 2N5445, 2N5446, T6410N
STUD



DIMENSIONAL OUTLINE FOR
T6420 SERIES
ISOLATED-STUD





TERMINAL CONNECTIONS

No. 1—Gate
No. 2—Main Terminal 1
Case, No. 3—Main Terminal 2






NOTES	MILLIMETERS		INCHES		SYMBOL	A	φD	φD ₁	φD ₂	J	M	N	φT	φT	φT ₁
	MAX.	MIN.	MAX.	MIN.											
	9.65	—	0.380	0.510	φD	—	0.501	0.465	0.825	1.000	20.95	25.40	5.71	1.73	3.75
	12.95	—	0.510	12.73	φD ₁	—	0.505	0.475	11.81	12.07	12.83	12.07	5.71	1.73	3.75
	12.83	—	0.505	—	φD ₂	—	0.505	0.475	11.81	12.07	12.83	12.07	5.71	1.73	3.75
	12.81	—	0.544	—	φD ₁	—	0.544	2.87	25.40	25.40	12.81	12.07	5.71	1.73	3.75
	13.81	—	0.544	—	φD ₁	—	0.544	2.87	25.40	25.40	13.81	12.07	5.71	1.73	3.75
	14.28	—	0.562	13.82	φD ₁	—	0.562	2.87	25.40	27.94	14.28	12.07	5.71	1.73	3.75
	14.28	—	0.562	13.82	φD ₁	—	0.562	2.87	25.40	27.94	14.28	12.07	5.71	1.73	3.75
	14.14	—	0.557	13.99	φD ₁	—	0.557	2.87	25.40	27.94	14.14	12.07	5.71	1.73	3.75
	15.59	—	0.614	15.34	φD	—	0.614	2.87	25.40	32.96	15.59	12.07	5.71	1.73	3.75
	15.59	—	0.614	15.34	φD	—	0.614	2.87	25.40	32.96	15.59	12.07	5.71	1.73	3.75
	17.09	—	0.673	—	φD	—	0.673	2.87	25.40	32.96	17.09	12.07	5.71	1.73	3.75
	17.09	—	0.673	—	φD	—	0.673	2.87	25.40	32.96	17.09	12.07	5.71	1.73	3.75
	18.82	—	0.745	—	φD	—	0.745	2.87	25.40	32.96	18.82	12.07	5.71	1.73	3.75
	18.82	—	0.745	—	φD	—	0.745	2.87	25.40	32.96	18.82	12.07	5.71	1.73	3.75
	19.30	—	0.764	—	φD	—	0.764	2.87	25.40	32.96	19.30	12.07	5.71	1.73	3.75
	19.30	—	0.764	—	φD	—	0.764	2.87	25.40	32.96	19.30	12.07	5.71	1.73	3.75
	20.32	—	0.804	—	φD	—	0.804	2.87	25.40	32.96	20.32	12.07	5.71	1.73	3.75
	20.32	—	0.804	—	φD	—	0.804	2.87	25.40	32.96	20.32	12.07	5.71	1.73	3.75
	21.34	—	0.844	—	φD	—	0.844	2.87	25.40	32.96	21.34	12.07	5.71	1.73	3.75
	21.34	—	0.844	—	φD	—	0.844	2.87	25.40	32.96	21.34	12.07	5.71	1.73	3.75
	22.36	—	0.884	—	φD	—	0.884	2.87	25.40	32.96	22.36	12.07	5.71	1.73	3.75
	22.36	—	0.884	—	φD	—	0.884	2.87	25.40	32.96	22.36	12.07	5.71	1.73	3.75
	23.38	—	0.924	—	φD	—	0.924	2.87	25.40	32.96	23.38	12.07	5.71	1.73	3.75
	23.38	—	0.924	—	φD	—	0.924	2.87	25.40	32.96	23.38	12.07	5.71	1.73	3.75
	24.40	—	0.964	—	φD	—	0.964	2.87	25.40	32.96	24.40	12.07	5.71	1.73	3.75
	24.40	—	0.964	—	φD	—	0.964	2.87	25.40	32.96	24.40	12.07	5.71	1.73	3.75
	25.42	—	1.004	—	φD	—	1.004	2.87	25.40	32.96	25.42	12.07	5.71	1.73	3.75
	25.42	—	1.004	—	φD	—	1.004	2.87	25.40	32.96	25.42	12.07	5.71	1.73	3.75
	26.44	—	1.044	—	φD	—	1.044	2.87	25.40	32.96	26.44	12.07	5.71	1.73	3.75
	26.44	—	1.044	—	φD	—	1.044	2.87	25.40	32.96	26.44	12.07	5.71	1.73	3.75
	27.46	—	1.084	—	φD	—	1.084	2.87	25.40	32.96	27.46	12.07	5.71	1.73	3.75
	27.46	—	1.084	—	φD	—	1.084	2.87	25.40	32.96	27.46	12.07	5.71	1.73	3.75
	28.48	—	1.124	—	φD	—	1.124	2.87	25.40	32.96	28.48	12.07	5.71	1.73	3.75
	28.48	—	1.124	—	φD	—	1.124	2.87	25.40	32.96	28.48	12.07	5.71	1.73	3.75
	29.50	—	1.164	—	φD	—	1.164	2.87	25.40	32.96	29.50	12.07	5.71	1.73	3.75
	29.50	—	1.164	—	φD	—	1.164	2.87	25.40	32.96	29.50	12.07	5.71	1.73	3.75
	30.52	—	1.204	—	φD	—	1.204	2.87	25.40	32.96	30.52	12.07	5.71	1.73	3.75
	30.52	—	1.204	—	φD	—	1.204	2.87	25.40	32.96	30.52	12.07	5.71	1.73	3.75
	31.54	—	1.244	—	φD	—	1.244	2.87	25.40	32.96	31.54	12.07	5.71	1.73	3.75
	31.54	—	1.244	—	φD	—	1.244	2.87	25.40	32.96	31.54	12.07	5.71	1.73	3.75
	32.56	—	1.284	—	φD	—	1.284	2.87	25.40	32.96	32.56	12.07	5.71	1.73	3.75
	32.56	—	1.284	—	φD	—	1.284	2.87	25.40	32.96	32.56	12.07	5.71	1.73	3.75
	33.58	—	1.324	—	φD	—	1.324	2.87	25.40	32.96	33.58	12.07	5.71	1.73	3.75
	33.58	—	1.324	—	φD	—	1.324	2.87	25.40	32.96	33.58	12.07	5.71	1.73	3.75
	34.60	—	1.364	—	φD	—	1.364	2.87	25.40	32.96	34.60	12.07	5.71	1.73	3.75
	34.60	—	1.364	—	φD	—	1.364	2.87	25.40	32.96	34.60	12.07	5.71	1.73	3.75
	35.62	—	1.404	—	φD	—	1.404	2.87	25.40	32.96	35.62	12.07	5.71	1.73	3.75
	35.62	—	1.404	—	φD	—	1.404	2.87	25.40	32.96	35.62	12.07	5.71	1.73	3.75
	36.64	—	1.444	—	φD	—	1.444	2.87	25.40	32.96	36.64	12.07	5.71	1.73	3.75
	36.64	—	1.444	—	φD	—	1.444	2.87	25.40	32.96	36.64	12.07	5.71	1.73	3.75
	37.66	—	1.484	—	φD	—	1.484	2.87	25.40	32.96	37.66	12.07	5.71	1.73	3.75
	37.66	—	1.484	—	φD	—	1.484	2.87	25.40	32.96	37.66	12.07	5.71	1.73	3.75
	38.68	—	1.524	—	φD	—	1.524	2.87	25.40	32.96	38.68	12.07	5.71	1.73	3.75
	38.68	—	1.524	—	φD	—	1.524	2.87	25.40	32.96	38.68	12.07	5.71	1.73	3.75
	39.70	—	1.564	—	φD	—	1.564	2.87	25.40	32.96	39.70	12.07	5.71	1.73	3.75
	39.70	—	1.564	—	φD	—	1.564	2.87	25.40	32.96	39.70	12.07	5.71	1.73	3.75
	40.72	—	1.604	—	φD	—	1.604	2.87	25.40	32.96	40.72	12.07	5.71	1.73	3.75
	40.72	—	1.604	—	φD	—	1.604	2.87	25.40	32.96	40.72	12.07	5.71	1.73	3.75
	41.74	—	1.644	—	φD	—	1.644	2.87	25.40	32.96	41.74	12.07	5.71	1.73	3.75
	41.74	—	1.644	—	φD	—	1.644	2.87	25.40	32.96	41.74	12.07	5.71	1.73	3.75
	42.76	—	1.684	—	φD	—	1.684	2.87	25.40	32.96	42.76	12.07	5.71	1.73	3.75
	42.76	—	1.684	—	φD	—	1.684	2.87	25.40	32.96	42.76	12.07	5.71	1.73	3.75
	43.78	—	1.724	—	φD	—	1.724	2.87	25.40	32.96	43.78	12.07	5.71	1.73	3.75
	43.78	—	1.724	—	φD	—	1.724	2.87	25.40	32.96	43.78	12.07	5.71	1.73	3.75
	44.80	—	1.764	—	φD	—	1.764	2.87	25.40	32.96	44.80	12.07	5.71	1.73	3.75
	44.80	—	1.764	—	φD	—	1.764	2.87	25.40	32.96	44.80	12.07	5.71	1.73	3.75
	45.82	—	1.804	—	φD	—	1.804	2.87	25.40	32.96	45.82	12.07	5.71	1.73	3.75
	45.82	—	1.804	—	φD	—	1.804	2.87	25.40	32.96	45.82	12.07	5.71	1.73	3.75
	46.84	—	1.844	—	φD	—	1.844	2.87	25.40	32.96	46.84	12.07	5.71	1.73	3.75
	46.84	—	1.844	—	φD	—	1.844	2.87	25.40	32.96	46.84	12.07	5.71	1.73	3.75
	47.86	—	1.884	—	φD	—	1.884	2.87	25.40	32.96	47.86	12.07	5.7		

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Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management