



STGP7NB60KD STGB7NB60KD STGP7NB60KDFP

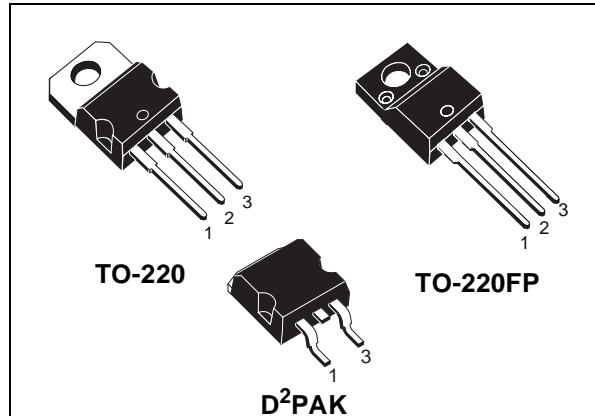
N-CHANNEL 7A - 600V - TO-220/TO-220FP/D²PAK

PowerMESH™ IGBT

ADVANCED DATA

TYPE	V _{CES}	V _{CE(sat)}	I _C
STGP7NB60KD	600 V	< 2.8 V	7 A
STGP7NB60KDFP	600 V	< 2.8 V	7 A
STGB7NB60KD	600 V	< 2.8 V	7 A

- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V_{cesat})
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- OFF LOSSES INCLUDE TAIL CURRENT
- VERY HIGH FREQUENCY OPERATION
- SHORT CIRCUIT RATED
- CO-PACKAGED WITH TURBOSWITCH™ ANTIPARALLEL DIODE

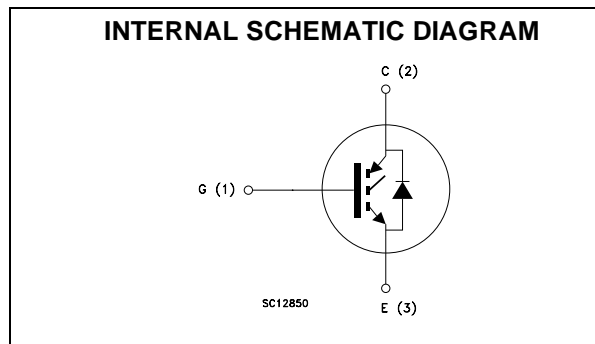


DESCRIPTION

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances. The suffix "K" identifies a family optimized for high frequency motor control applications with short circuit withstand capability.

APPLICATIONS

- HIGH FREQUENCY MOTOR CONTROLS
- SMPS AND PFC IN BOTH HARD SWITCH AND RESONANT TOPOLOGIES



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STGP7NB60KD STGB7NB60KD	STGP7NB60KDFP	
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	600		V
V _{ECR}	Emitter-Collector Voltage	20		V
V _{GE}	Gate-Emitter Voltage	±20		V
I _C	Collector Current (continuous) at T _C = 25°C	14		A
I _C	Collector Current (continuous) at T _C = 125°C	7		A
I _{CM} (■)	Collector Current (pulsed)	56		A
P _{TOT}	Total Dissipation at T _C = 25°C	80	35	W
	Derating Factor	0.64	0.28	W/°C
V _{ISO}	Insulation Withstand Voltage A.C. (t = 1 sec; T _c = 25°C)	--	2500	V
T _{stg}	Storage Temperature	-65 to 150		°C
T _j	Max. Operating Junction Temperature	150		°C

(■) Pulse width limited by safe operating area

STGP7NB60KD/FP/STGB7NB60KD

THERMAL DATA

		TO-220 D ² PAK	TO-220FP	
Rthj-case	Thermal Resistance Junction-case Max	1.56	3.57	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5		°C/W
Rthc-h	Thermal Resistance Case-heatsink Typ	0.5		°C/W

ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{BR(CES)}	Collector-Emitter Breakdown Voltage	I _C = 250 μA, V _{GE} = 0	600			V
I _{CES}	Collector cut-off (V _{GE} = 0)	V _{CE} = Max Rating, T _C = 25 °C V _{CE} = Max Rating, T _C = 125 °C			50 500	μA μA
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 0)	V _{GE} = ±20V, V _{CE} = 0			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GE(th)}	Gate Threshold Voltage	V _{CE} = V _{GE} , I _C = 250μA	5		7	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} = 15V, I _C = 7 A V _{GE} = 15V, I _C = 7 A, T _C = 100°C		2.3 1.9	2.8	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{CE} = 25 V, I _C = 7 A		5		S
C _{ies}	Input Capacitance	V _{CE} = 25V, f = 1 MHz, V _{GE} = 0		560		pF
C _{oes}	Output Capacitance			68		pF
C _{res}	Reverse Transfer Capacitance			15		pF
Q _g	Total Gate Charge	V _{CE} = 480V, I _C = 7 A, V _{GE} = 15V		42		nC
Q _{ge}	Gate-Emitter Charge			7.9		nC
Q _{gc}	Gate-Collector Charge			17.6		nC
t _{scw}	Short Circuit Withstand Time	V _{ce} = 0.5 V _{BR(CES)} , V _{GE} = 15 V, T _j = 125°C, R _G = 10 Ω	10			μs

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{d(on)}	Turn-on Delay Time	V _{CC} = 480 V, I _C = 7 A R _G = 10Ω, V _{GE} = 15 V		15		ns
t _r	Rise Time			48		ns
(di/dt) _{on}	Turn-on Current Slope	V _{CC} = 480 V, I _C = 7 A R _G = 10Ω V _{GE} = 15 V, T _j = 125°C		160		A/μs
E _{on}	Turn-on Switching Losses			70		μJ

ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
t_c	Cross-over Time	$V_{CC} = 480 \text{ V}$, $I_C = 7 \text{ A}$, $R_{GE} = 10 \Omega$, $V_{GE} = 15 \text{ V}$		85		ns	
$t_r(V_{off})$	Off Voltage Rise Time			20		ns	
$t_{d(off)}$	Delay Time			75		ns	
t_f	Fall Time			70		ns	
$E_{off(**)}$	Turn-off Switching Loss				85		μJ
E_{ts}	Total Switching Loss				235		μJ
t_c	Cross-over Time	$V_{CC} = 480 \text{ V}$, $I_C = 7 \text{ A}$, $R_{GE} = 10 \Omega$, $V_{GE} = 15 \text{ V}$ $T_j = 125 \text{ }^\circ\text{C}$		150		ns	
$t_r(V_{off})$	Off Voltage Rise Time			50		ns	
$t_{d(off)}$	Delay Time			110		ns	
t_f	Fall Time			110		ns	
$E_{off(**)}$	Turn-off Switching Loss				220		μJ
E_{ts}	Total Switching Loss				405		μJ

COLLECTOR-EMITTER DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_f	Forward Current				6	A
I_{fm}	Forward Current pulsed				48	A
V_f	Forward On-Voltage	$I_f = 6 \text{ A}$ $I_f = 6 \text{ A}$, $T_j = 125 \text{ }^\circ\text{C}$		1.8	2.2	V
					1.4	V
t_{rr}	Reverse Recovery Time	$I_f = 6 \text{ A}$, $V_R = 200 \text{ V}$, $T_j = 125 \text{ }^\circ\text{C}$, $di/dt = 100 \text{ A}/\mu\text{s}$		100		ns
Q_{rr}	Reverse Recovery Charge				135	nC
I_{rrm}	Reverse Recovery Current				2.7	A

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
 2. Pulse width limited by max. junction temperature.
 (**)Losses include Also the Tail (Jedec Standardization)

Fig. 1: Gate Charge test Circuit

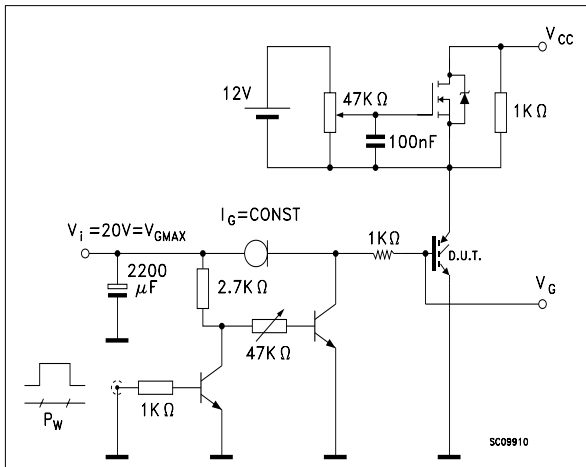
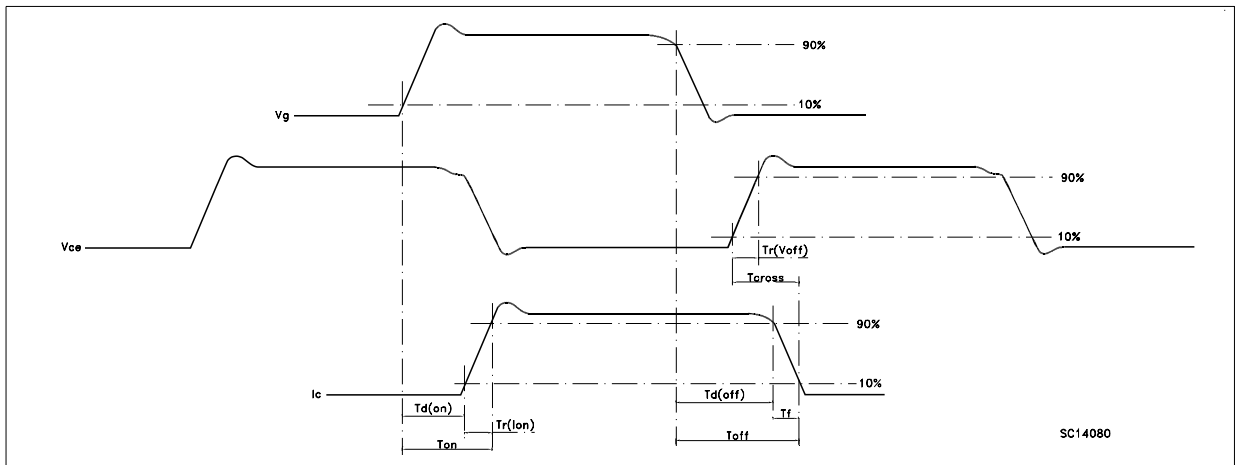
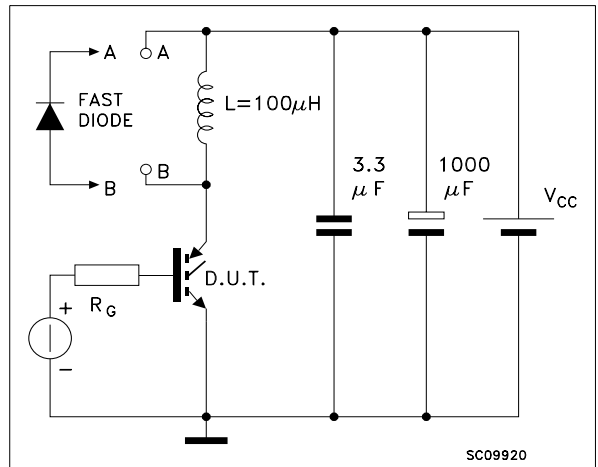
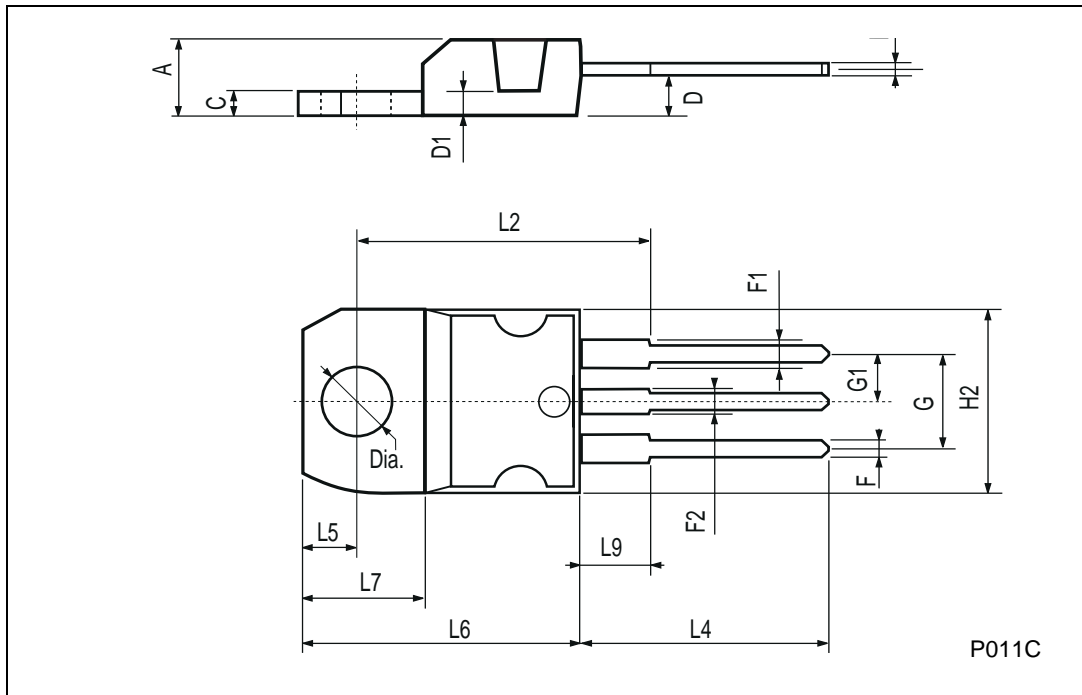


Fig. 2: Test Circuit For Inductive Load Switching



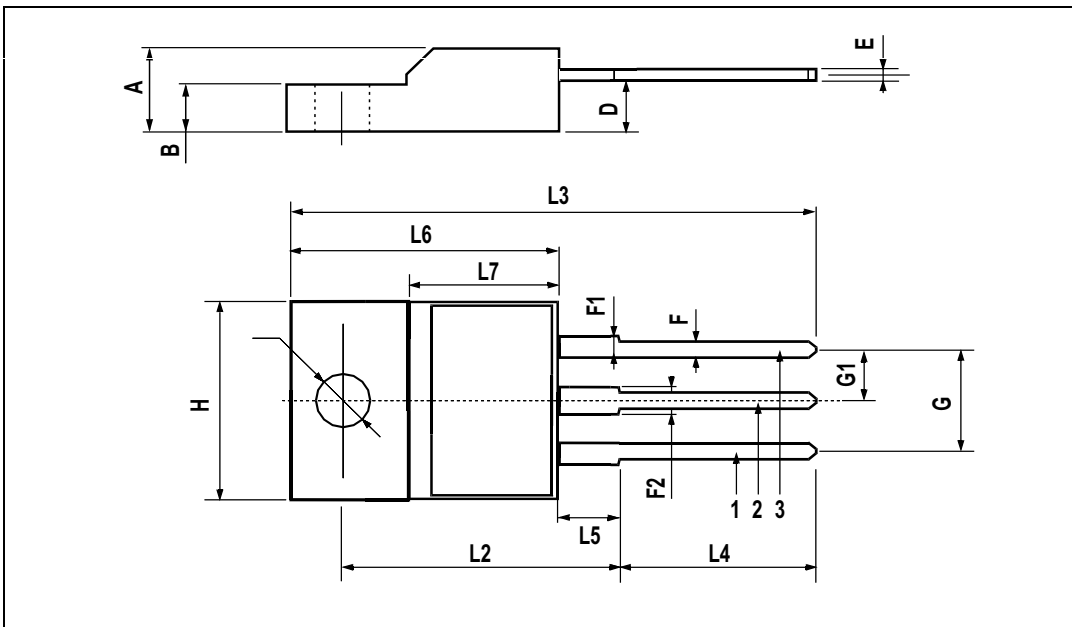
TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



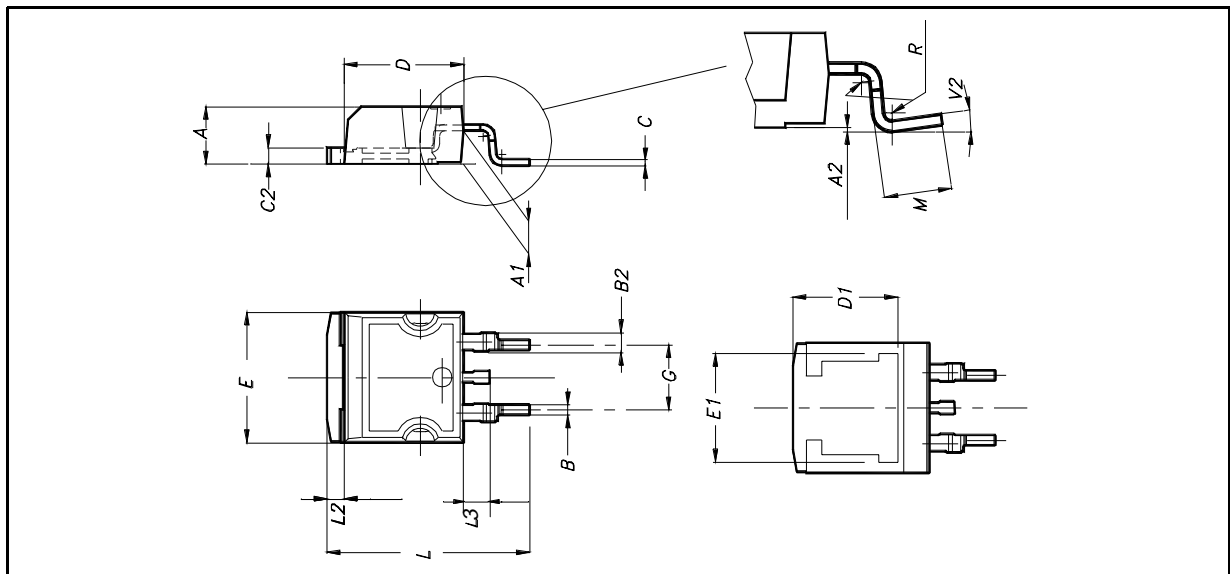
TO-220FP MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	.0385		0.417
L5	2.9		3.6	0.114		0.141
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126

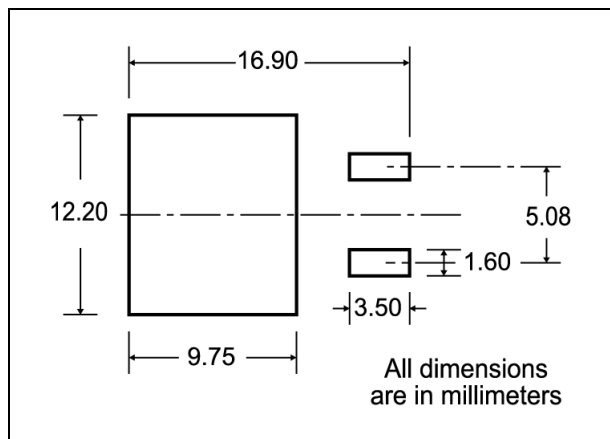


D²PAK MECHANICAL DATA

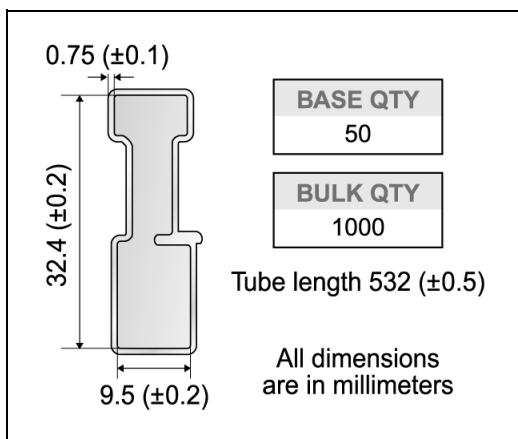
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.625
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0°		8°			



D²PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

40 mm min. Access hole at slot location

Full radius

Tape slot in core for tape start 2.5mm min. width

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	10.5	10.7	0.413	0.421
B0	15.7	15.9	0.618	0.626
D	1.5	1.6	0.059	0.063
D1	1.59	1.61	0.062	0.063
E	1.65	1.85	0.065	0.073
F	11.4	11.6	0.449	0.456
K0	4.8	5.0	0.189	0.197
P0	3.9	4.1	0.153	0.161
P1	11.9	12.1	0.468	0.476
P2	1.9	2.1	0.075	0.082
R	50		1.574	
T	0.25	0.35	0.0098	0.0137
W	23.7	24.3	0.933	0.956

REEL MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

10 pitches cumulative tolerance on tape +/- 0.2 mm

Center line of cavity

User Direction of Feed

FEED DIRECTION

Bending radius

R min.

* on sales type

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