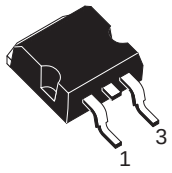
STGB7NB40LZ

N-CHANNEL CLAMPED 14A - D²PAK
INTERNALLY CLAMPED PowerMESH™ IGBT

TYPE	V_{CES}	$V_{CE(sat)}$	I_C
STGB7NB40LZ	CLAMPED	< 1.50 V	14 A

- POLYSILICON GATE VOLTAGE DRIVEN
- LOW THRESHOLD VOLTAGE
- LOW ON-VOLTAGE DROP
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- HIGH VOLTAGE CLAMPING FEATURE

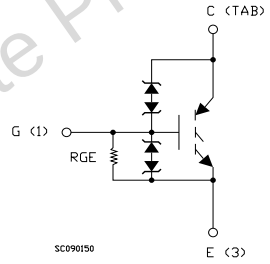


D²PAK

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 built in collector-gate zener exhibits a very precise active clamping while the gate-emitter zener supplies an ESD protection.

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- AUTOMOTIVE IGNITION

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GS} = 0)	CLAMPED	V
V_{ECR}	Reverse Battery Protection	20	V
V_{GE}	Gate-Emitter Voltage	CLAMPED	V
I_C	Collector Current (continuous) at 100°C	14	A
P_G	Minimum External Gate Resistor	500	Ω
P_{TOT}	Total Dissipation at T_C = 25°C	100	W
	Derating Factor	0.66	W/°C
E_{CL}	Single Pulse Collector to Emitter Avalanche Energy I_C= 13 A ; T_j= 150°C (see fig.1-2)	130	mJ
E_{ECAV}	Reverse Avalanche Energy I_C = 7 A ;f= 100 Hz ; T_c = 25°C	10	mJ
T_{stg}	Storage Temperature	–55 to 175	°C
T_j	Operating Junction Temperature		

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	1.5	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max (free air)	62.5	°C/W

ELECTRICAL CHARACTERISTICS (T_{CASE} = 25°C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$BV_{(CES)}$	Collector-Emitter Clamped Voltage	I_C = 10 mA, V_{GE} = 0, Tc= - 40°C to 150°C; R_G= 1 KΩ	370	400	430	V
$BV_{(ECS)}$	Emitter Collector Break-down Voltage	I_{EC} = 75 mA, V_{GE} = 0,	20	27		V
BV_{GE}	Gate Emitter Break-down Voltage	I_G = ± 2 mA	12		16	V
I_{CES}	Collector-Emitter Leakage Current	V_{GE} = 200 V, V_{GE} = 0, R_G= 1 KΩ Tc=25°C Tc=150°C			 25 250	 µA µA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ± 10 V , V_{CE} = 0			1000	µA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE} = V_{GE}, I_C = 1 mA, Tc=25°C V_{CE} = V_{GE}, I_C = 1 mA, Tc=150°C	1.2 0.75		2.2 1.8	V V
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	V_{GE} =4.5 V, I_C = 7 A, Tj= 25°C V_{GE} =5.0 V, I_C = 14 A, Tc= 25°C		1.3	1.50 1.9	V V
R_{GE}	Gate Emitter Resistance		10	20	30	KΩ

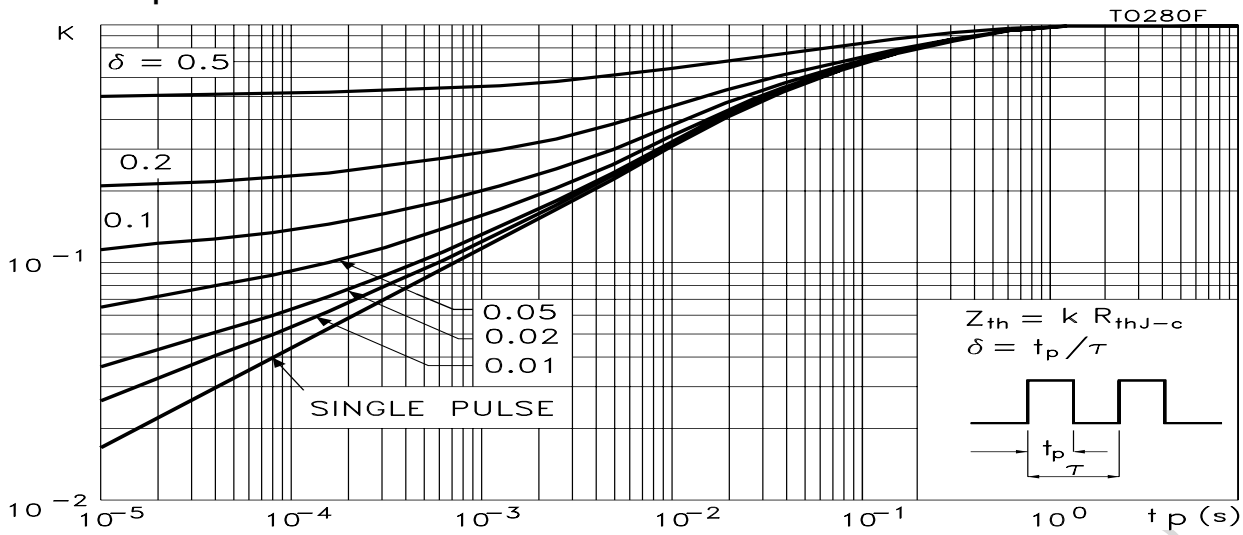
DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{ies}	Input Capacitance	V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0		910		pF
C_{oes}	Output Capacitance			80		pF
C_{res}	Reverse Transfer Capacitance			15		pF
Q_g	Gate Charge	V_{CE} = 40 V, I_C = 7 A, V_{GE} = 5 V		22		nC

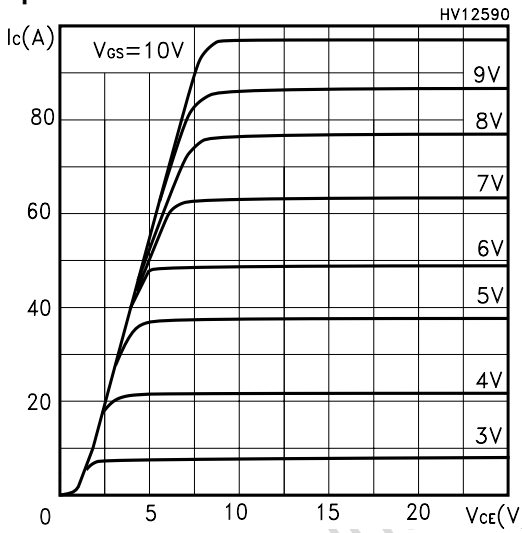
SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Delay Time Current Rise Time	V_{CE} = 14 V, R_G =1KΩ , R_L = 1Ω, V_{GE} =5 V		0.9 4.5		µs µs
$t_{d(off)}$ t_f	Delay Time Current Fall Time	V_{CE} = 300 V, R_G =1KΩ , R_L = 46Ω, V_{GE} =5 V		4.4 3.6		µs µs

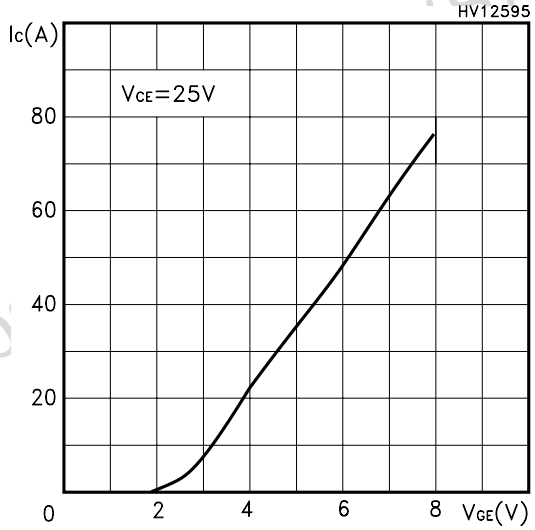
Thermal Impedance



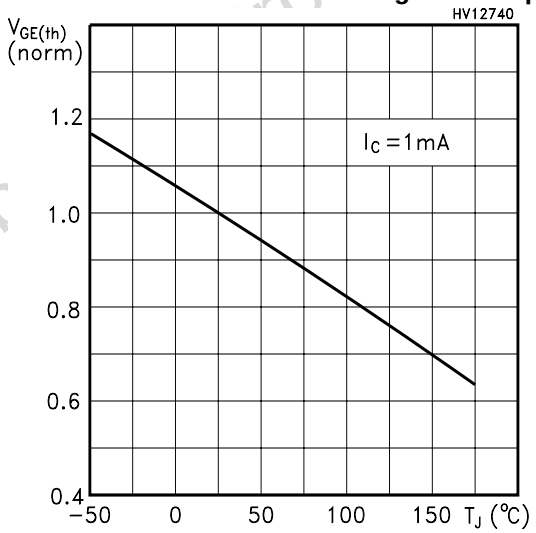
Output Characteristics



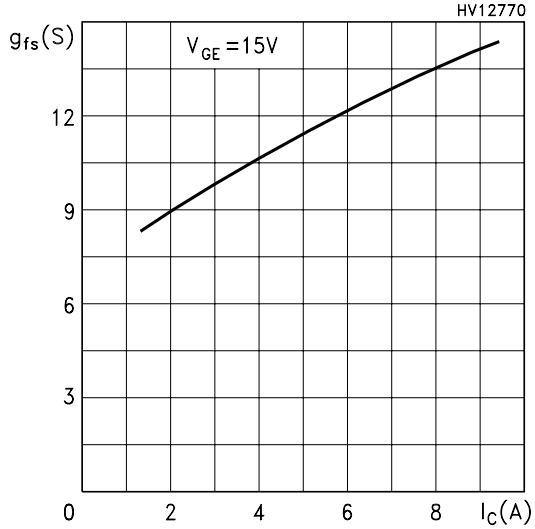
Transfer Characteristics



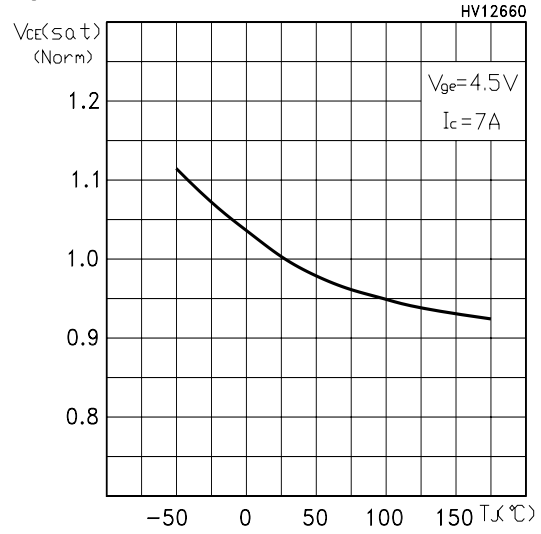
Normalized Gate Threshold Voltage vs Temp.



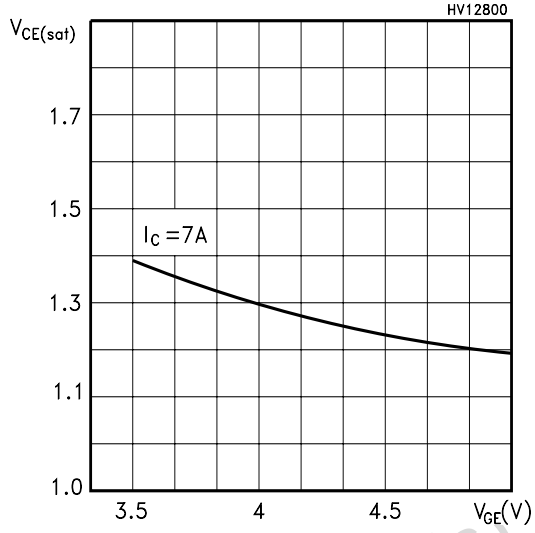
Transconductance



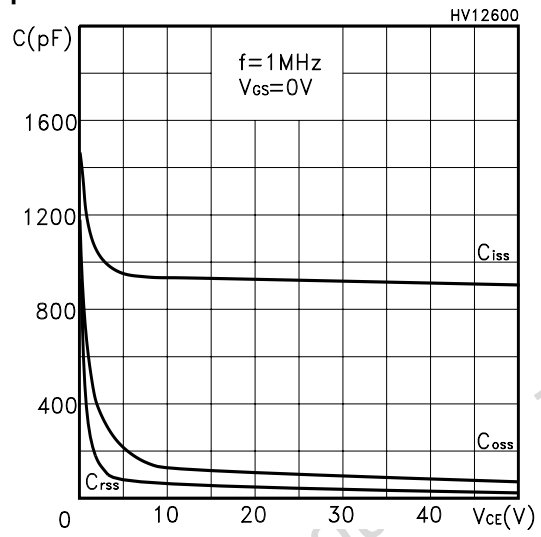
Normalized Collector-Emitter On Voltage vs Temperature



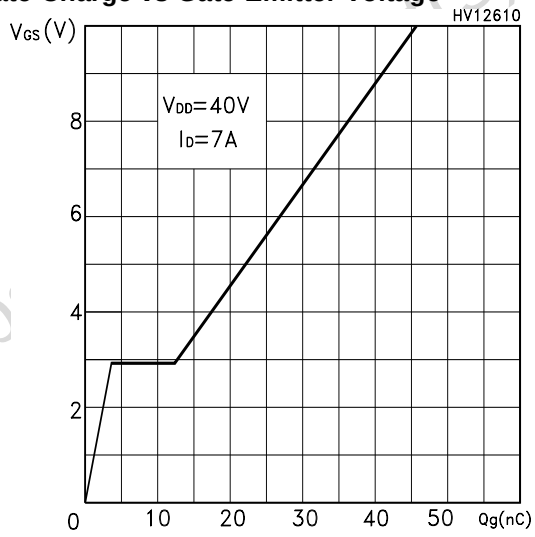
Collector-Emitter On Voltage vs Gate-Emitter Voltage



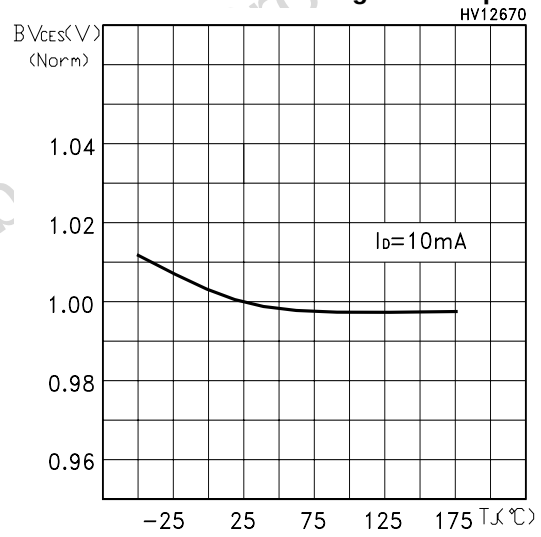
Capacitance Variations



Gate-Charge vs Gate-Emitter Voltage



Normalized Break-down Voltage vs Temp.



Clamping Voltage vs Gate Resistance

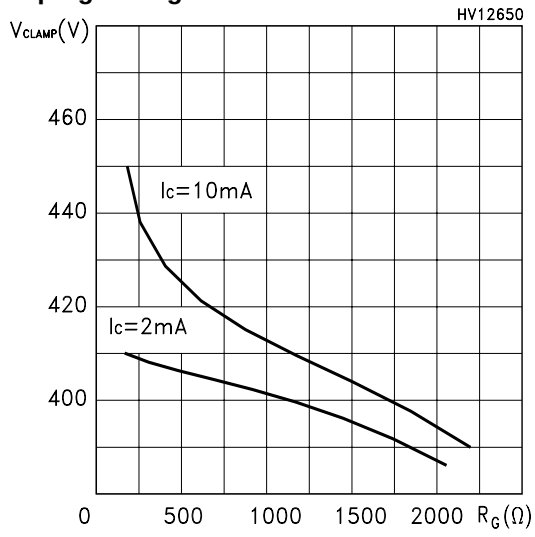


Fig. 1: Unclamped Inductive Load Test Circuit

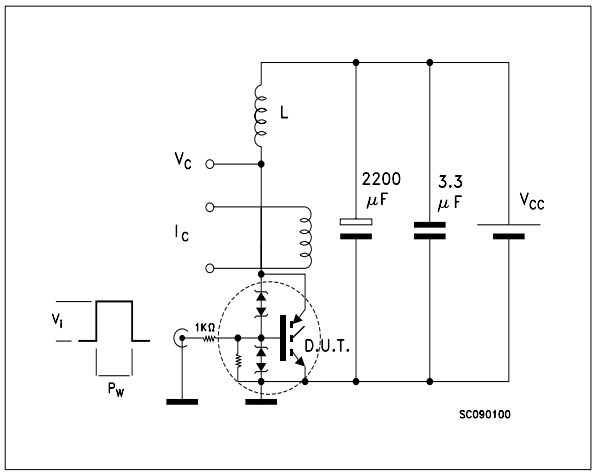


Fig. 2: Unclamped Inductive Waveform

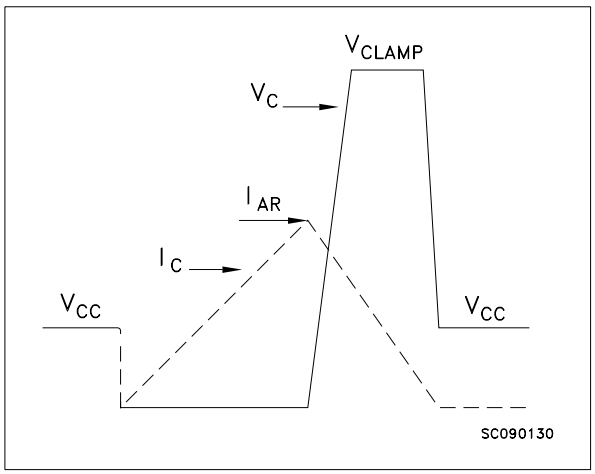


Fig. 3: Test Circuit For Inductive Load Switching And Diode Recovery Times

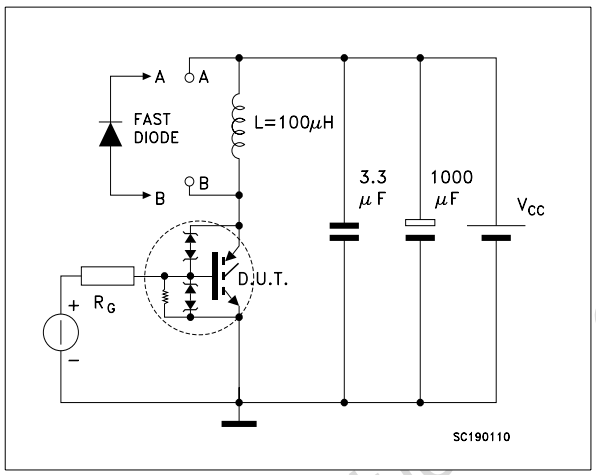
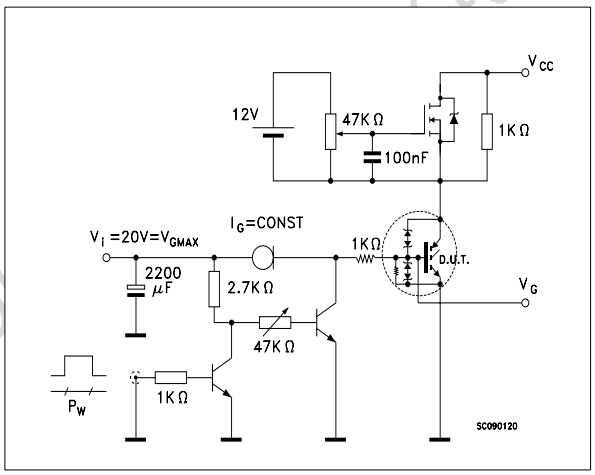
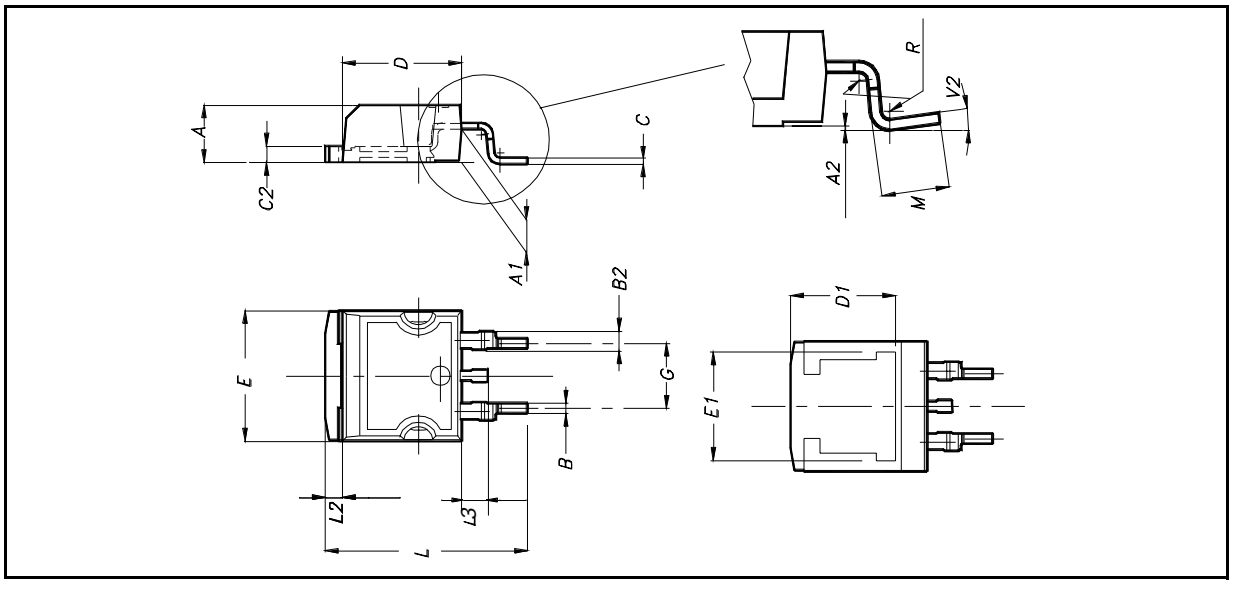


Fig. 4: Gate Charge test Circuit

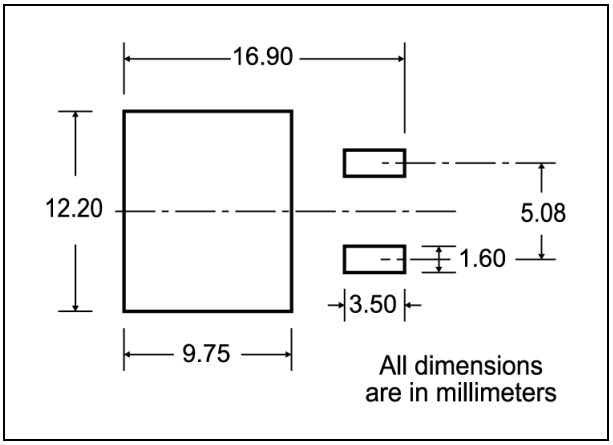


D²PAK MECHANICAL DATA

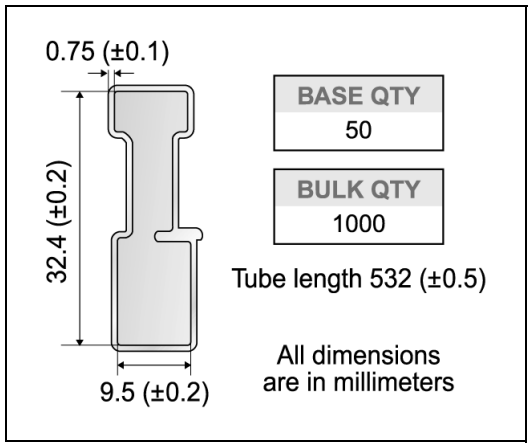
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
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	0º		8º			



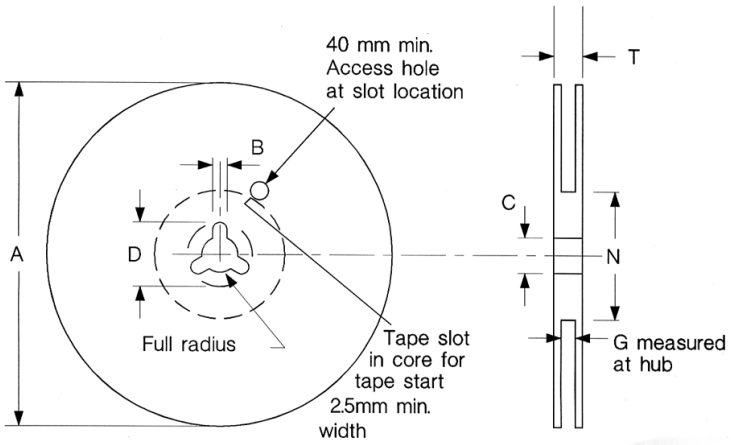
D^2PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*



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		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

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