



STD30NF06L

N-CHANNEL 60V - 0.022Ω - 35A DPAK/IPAK STripFET™ POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STD30NF06L	60 V	<0.028Ω	35 A

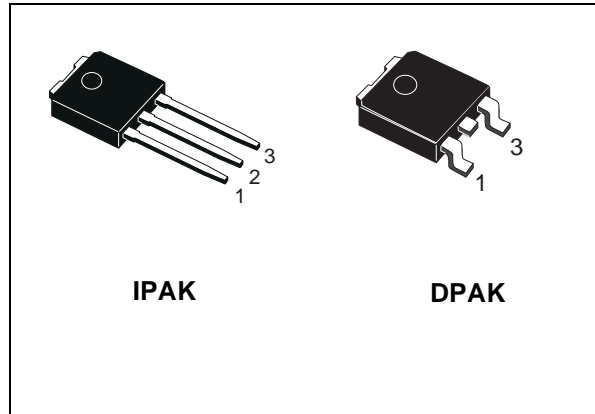
- TYPICAL R_{DS(on)} = 0.022Ω
- EXCEPTIONAL dv/dt CAPABILITY
- LOGIC LEVEL GATE DRIVE
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL
- ADD SUFFIX "-1" FOR ORDERING IN IPAK
- CHARACTERIZATION ORIENTED FOR AUTOMOTIVE APPLICATIONS

DESCRIPTION

This Power Mosfet is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- HIGH-EFFICIENCY DC-DC CONVERTERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC & DC-AC CONVERTERS
- AUTOMOTIVE



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	60	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	60	V
V _{GS}	Gate- source Voltage	± 20	V
I _D	Drain Current (continuous) at T _C = 25°C	35	A
I _D	Drain Current (continuous) at T _C = 100°C	25	A
I _{DM} (●)	Drain Current (pulsed)	140	A
P _{TOT}	Total Dissipation at T _C = 25°C	70	W
	Derating Factor	0.46	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	25	V/ns
T _{stg}	Storage Temperature	- 55 to 175	°C
T _j	Operating Junction Temperature		

(●) Pulse width limited by safe operating area

(1) I_{SD} ≤ 38A, di/dt ≤ 400A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}.

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THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	2.14	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	100	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose	275	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	35	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	150	mJ

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0	60			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating, T _C = 125 °C			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 20 V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	1	1.7	2.5	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 5 V, I _D = 18 A V _{GS} = 10 V, I _D = 18 A		0.025 0.022	0.03 0.028	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} > =15 V, I _D =15 A		25		S
C _{iss}	Input Capacitance	V _{DS} = 25 V, f = 1 MHz, V _{GS} = 0		1600		pF
C _{oss}	Output Capacitance			215		pF
C _{rss}	Reverse Transfer Capacitance			60		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 30\text{ V}, I_D = 18\text{ A}$		30		ns
t_r	Rise Time	$R_G = 4.7\Omega, V_{GS} = 4.5\text{ V}$ (see test circuit, Figure 3)		105		ns
Q_g	Total Gate Charge	$V_{DD} = 48\text{ V}, I_D = 38\text{ A},$		23	31	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 5\text{ V}$		7		nC
Q_{gd}	Gate-Drain Charge			10		nC

SWITCHING OFF

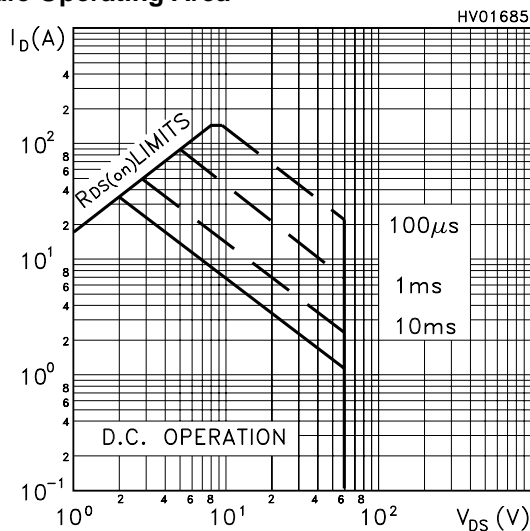
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 30\text{ V}, I_D = 18\text{ A},$		65		ns
t_f	Fall Time	$R_G = 4.7\Omega, V_{GS} = 4.5\text{ V}$ (see test circuit, Figure 3)		25		ns

SOURCE DRAIN DIODE

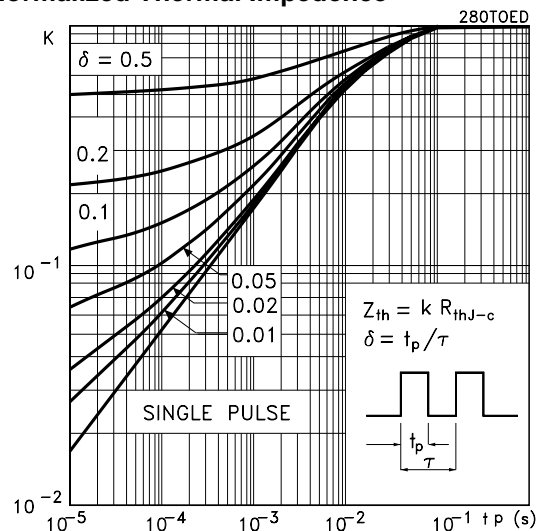
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				35	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				140	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 35\text{ A}, V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 38\text{ A}, di/dt = 100\text{ A}/\mu\text{s},$		70		ns
Q_{rr}	Reverse Recovery Charge	$V_{DD} = 15\text{ V}, T_j = 150^\circ\text{C}$		140		nC
I_{RRM}	Reverse Recovery Current	(see test circuit, Figure 5)		4		A

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
2. Pulse width limited by safe operating area.

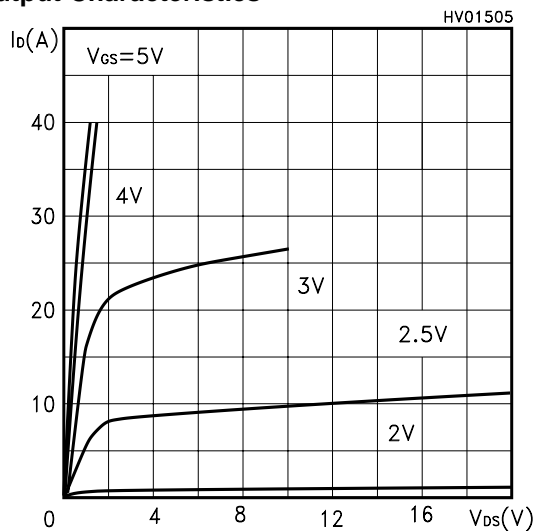
Safe Operating Area



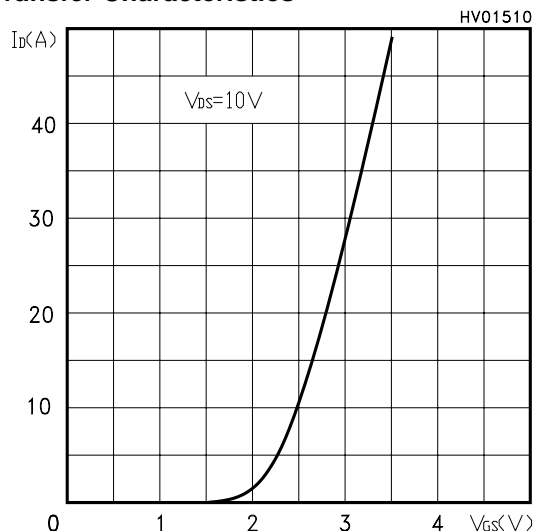
Normalized Thermal Impedance



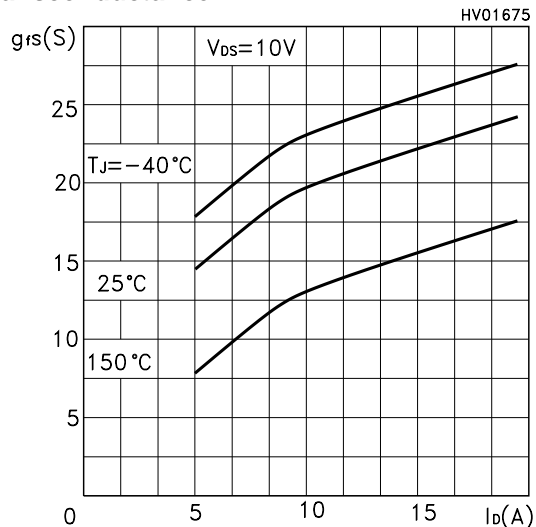
Output Characteristics



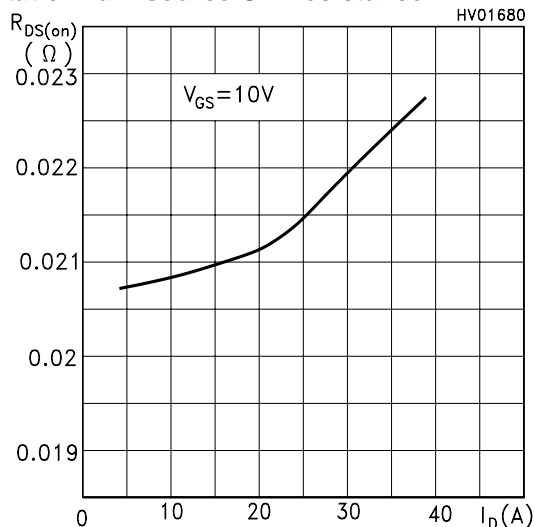
Transfer Characteristics



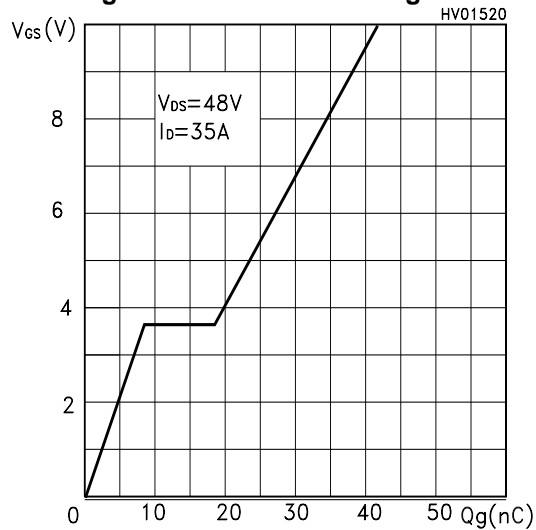
Transconductance



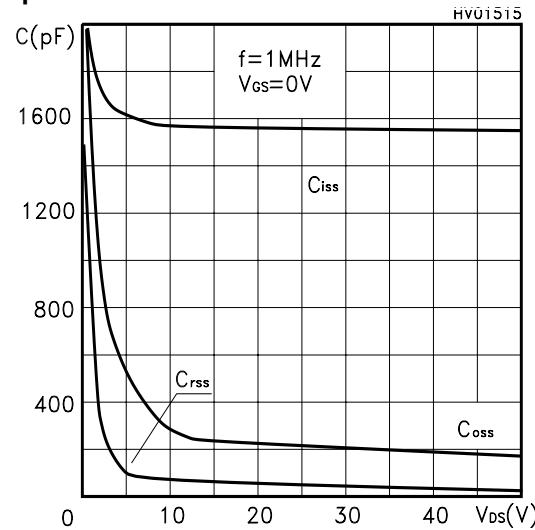
Static Drain-source On Resistance



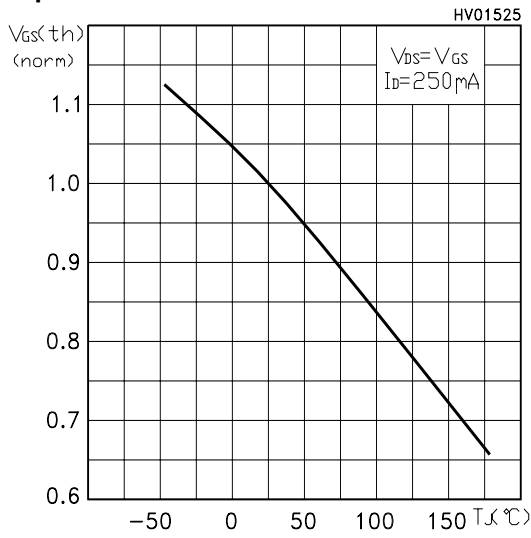
Gate Charge vs Gate-source Voltage



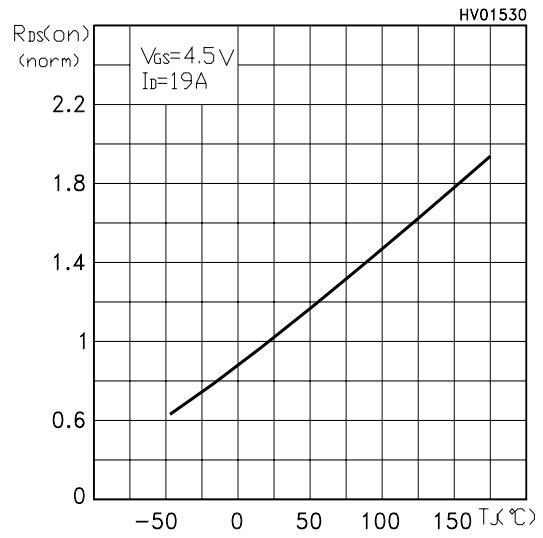
Capacitance Variations



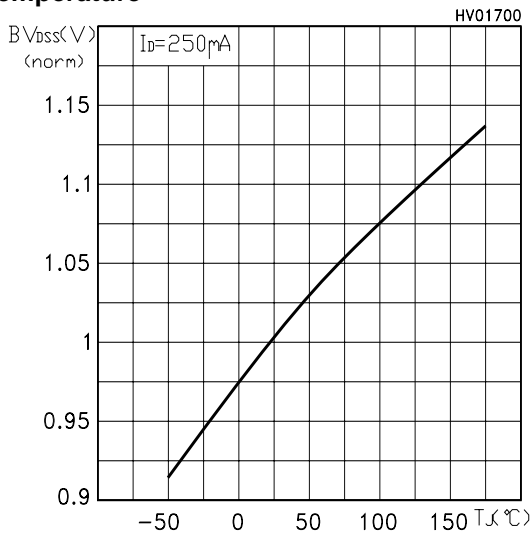
Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Normalized Drain-Source Breakdown vs Temperature



Source-drain Diode Forward Characteristics

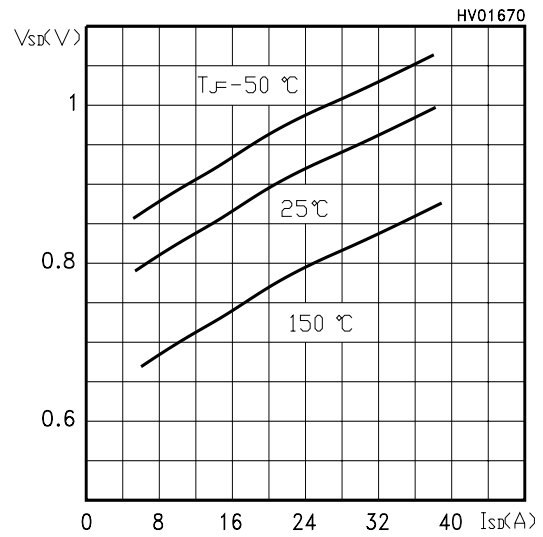


Fig. 1: Unclamped Inductive Load Test Circuit



Fig. 2: Unclamped Inductive Waveform



Fig. 3: Switching Times Test Circuit For Resistive Load



Fig. 4: Gate Charge test Circuit

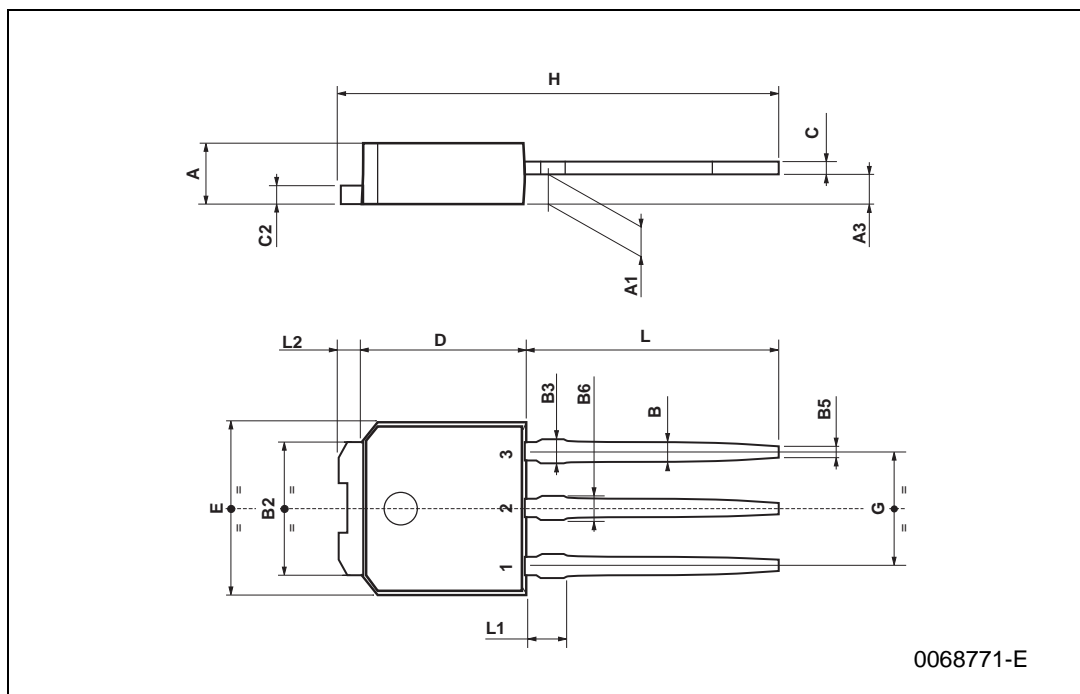


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



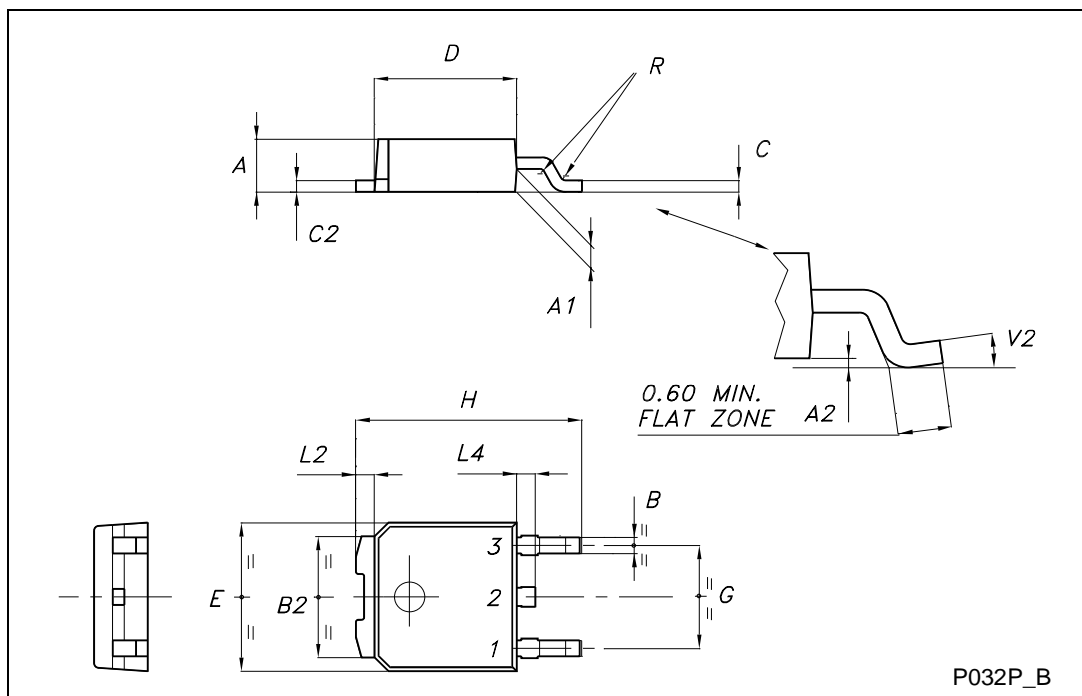
TO-251 (IPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.031
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039

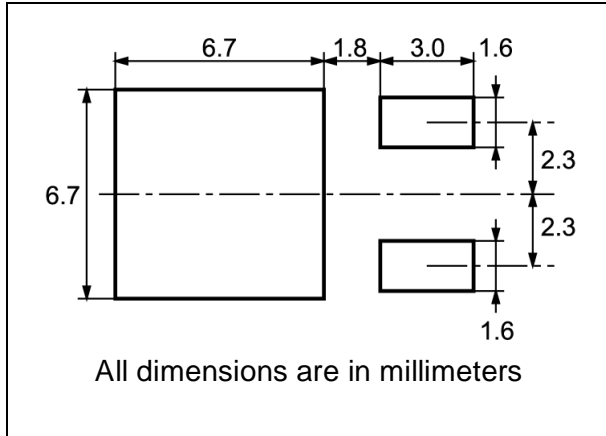


TO-252 (DPAK) MECHANICAL DATA

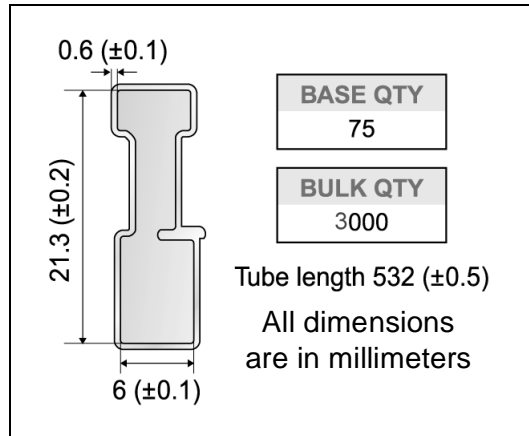
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0°		8°	0°		0°



DPAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

Diagram showing the tape and reel shipment dimensions. The tape width is A, the tape thickness is T, the tape slot width is B, the tape slot depth is C, the tape slot length is D, the tape slot width at the core is 2.5 mm min. width, the tape slot length at the core is G measured at hub, the tape slot length at the hub is N, the tape slot length at the core is 40 mm min. Access hole at slot location, the tape slot length at the core is Full radius, the tape slot length at the core is 2.5 mm min. width. All dimensions are in millimeters.

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	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

BASE QTY		BULK QTY	
2500		2500	

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641

Diagram showing the tape mechanical data. The tape width is W, the tape thickness is T, the tape slot width is B0, the tape slot depth is D, the tape slot length is A0, the tape slot width at the core is D1, the tape slot length at the core is P1, the tape slot length at the core is P2, the tape slot length at the core is P0, the tape slot length at the core is E, the tape slot length at the core is F, the tape slot length at the core is K0, the tape slot length at the core is D, the tape slot length at the core is B1, the tape slot length at the core is T, the tape slot length at the core is TOP COVER TAPE, the tape slot length at the core is 10 pitches cumulative tolerance on tape +/- 0.2 mm, the tape slot length at the core is Center line of cavity, the tape slot length at the core is R min., the tape slot length at the core is Bending radius, the tape slot length at the core is FEED DIRECTION, the tape slot length at the core is TRL, the tape slot length at the core is For machine ref. only including draft and radii concentric around B0.

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