



STD30NF06

N-CHANNEL 60V - 0.020 Ω - 28A IPAK/DPAK STripFET™ II POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STD30NF06	60 V	<0.028 Ω	28 A

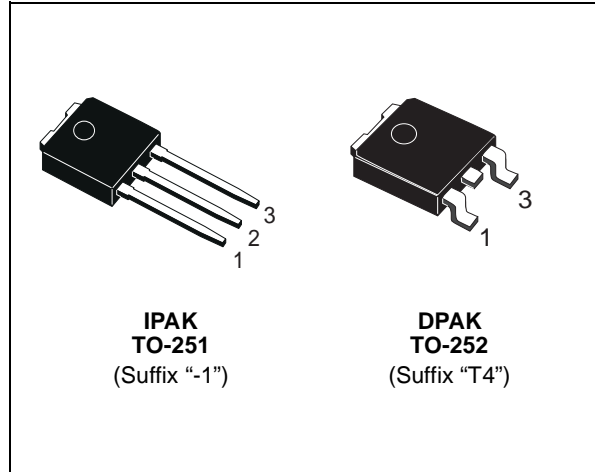
- TYPICAL R_{DS(on)} = 0.020Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- THROUGH-HOLE IPAK (TO-251) POWER PACKAGE IN TUBE (SUFFIX "-1")
- SURFACE-MOUNTING DPAK (TO-252) POWER PACKAGE IN TAPE & REEL (SUFFIX "T4")

DESCRIPTION

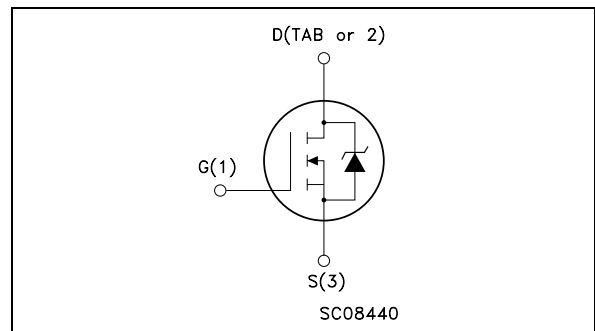
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

APPLICATIONS

- HIGH CURRENT, HIGH SWITCHING SPEED
- MOTOR CONTROL , AUDIO AMPLIFIERS
- SOLENOID AND RELAY DRIVERS
- DC-DC & DC-AC CONVERTERS



INTERNAL SCHEMATIC DIAGRAM



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	28	A
I _D	Drain Current (continuous) at T _C = 100°C	20	A
I _{DM} (●)	Drain Current (pulsed)	112	A
P _{tot}	Total Dissipation at T _C = 25°C	70	W
	Derating Factor	0.47	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	10	V/ns
E _{AS} (2)	Single Pulse Avalanche Energy	230	mJ
T _{stg}	Storage Temperature	-55 to 175	°C
T _j	Max. Operating Junction Temperature		

(●) Pulse width limited by safe operating area.

(1) I_{SD} ≤ 28A, di/dt ≤ 300A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}
 (2) Starting T_j = 25 °C, I_D = 15A, V_{DD} = 30V

STD30NF06

THERMAL DATA

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

ELECTRICAL CHARACTERISTICS (T_{case} = 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 = 100°C			1 10	µA µA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 20 V			±100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} I _D = 250 µA	2		4	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V I _D = 15 A		0.020	0.028	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} = 15 V I _D = 15 A		40		S
C _{iSS}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		1750		pF
C _{oSS}	Output Capacitance			220		pF
C _{rSS}	Reverse Transfer Capacitance			70		pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{DD} = 30\text{ V}$ $I_D = 19\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		20 100		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 48\text{ V}$ $I_D = 38\text{ A}$ $V_{GS} = 10\text{ V}$		43 9.5 15	58	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 30\text{ V}$ $I_D = 19\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		50 20		ns ns

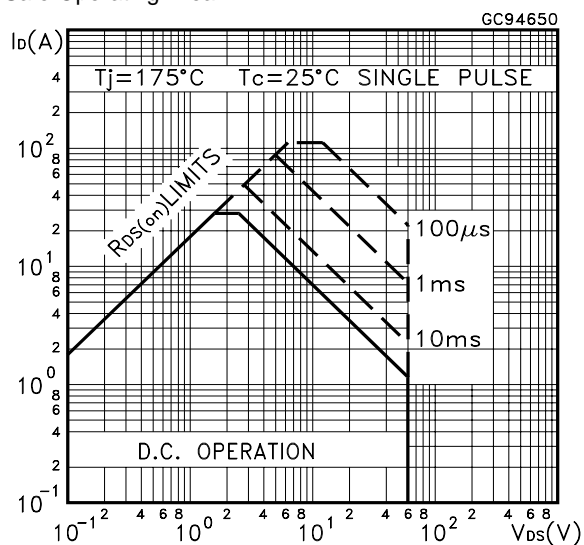
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM} (\bullet)$	Source-drain Current Source-drain Current (pulsed)				28 112	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 28\text{ A}$ $V_{GS} = 0$			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 28\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		95 260 5.5		ns μC A

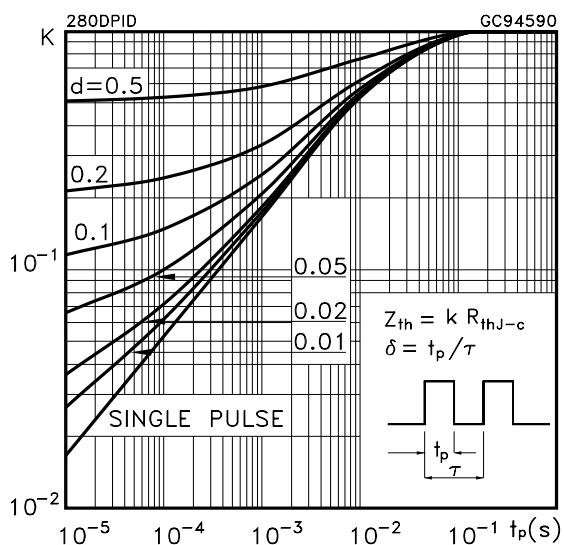
(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

(\bullet) Pulse width limited by safe operating area.

Safe Operating Area

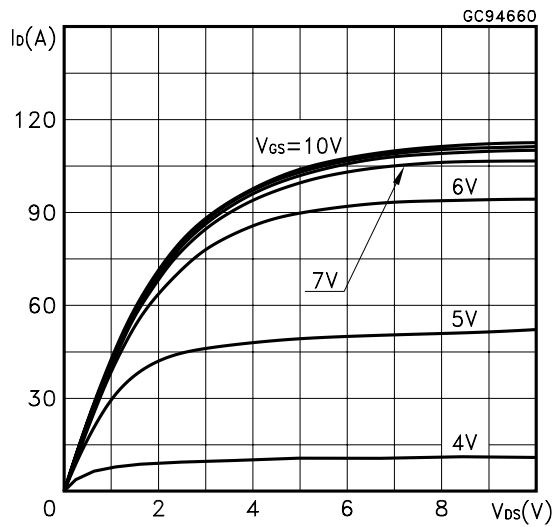


Thermal Impedance

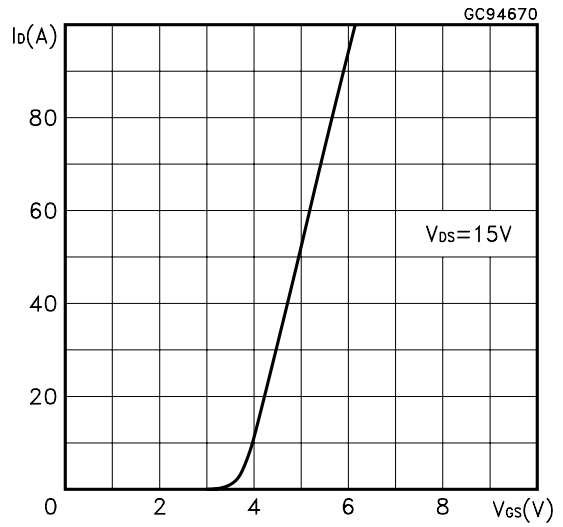


STD30NF06

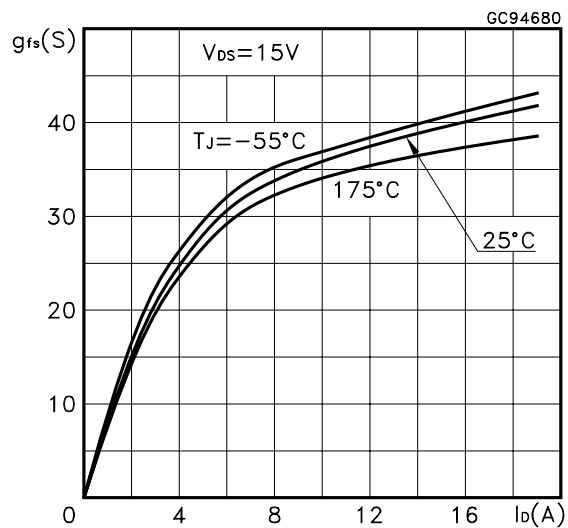
Output Characteristics



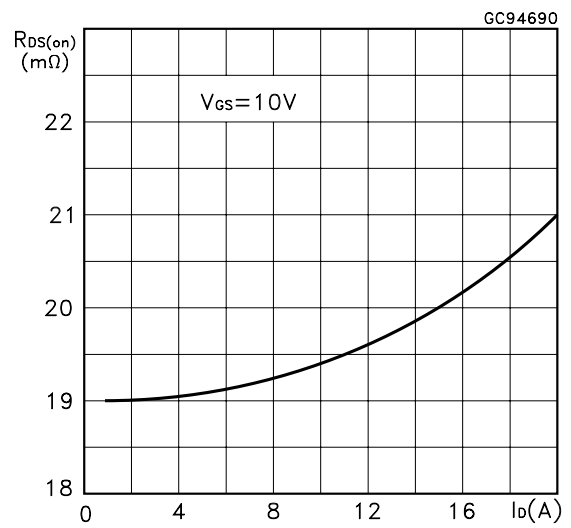
Transfer Characteristics



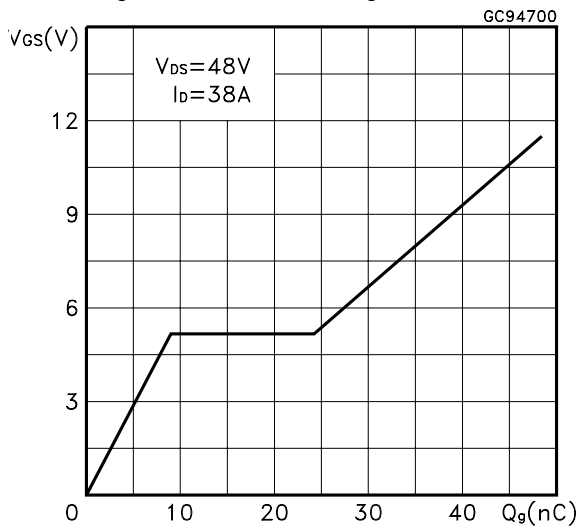
Transconductance



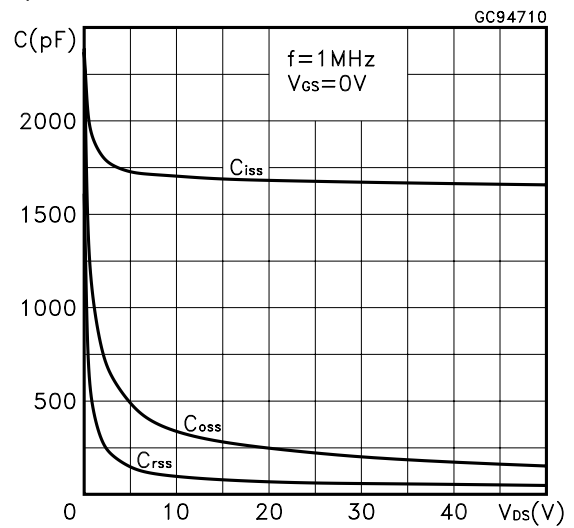
Static Drain-source On Resistance



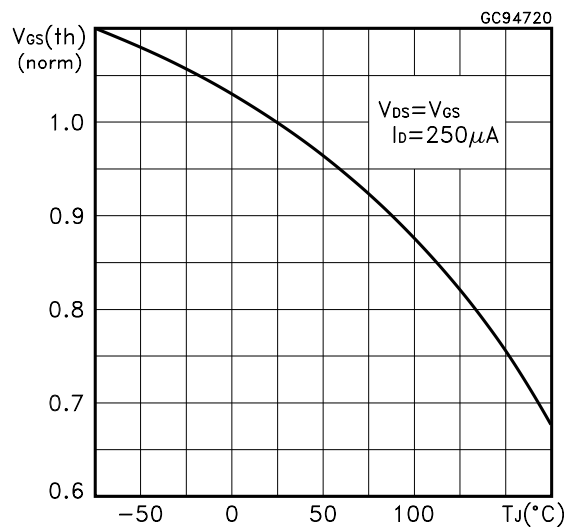
Gate Charge vs Gate-source Voltage



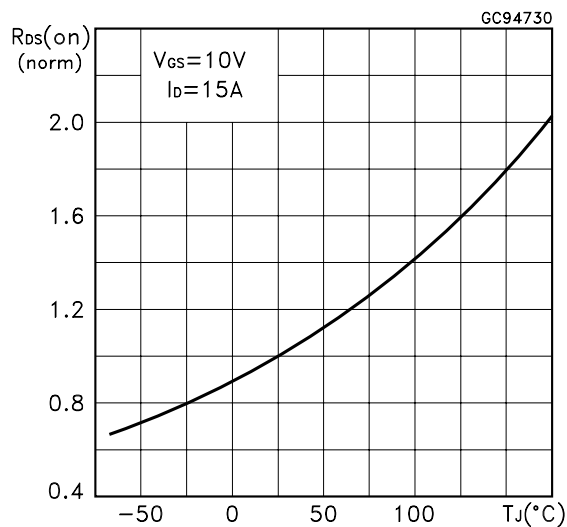
Capacitance Variations



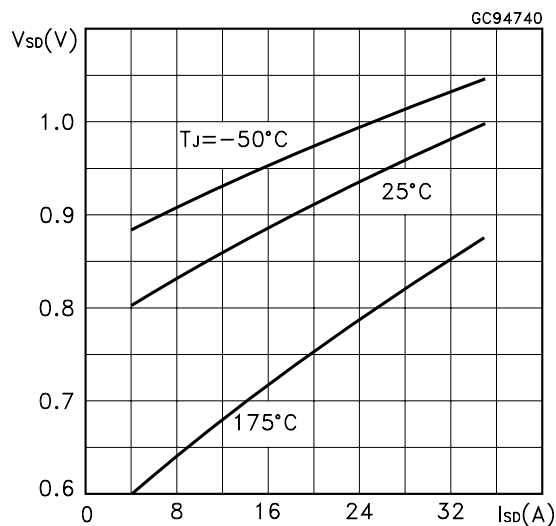
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature

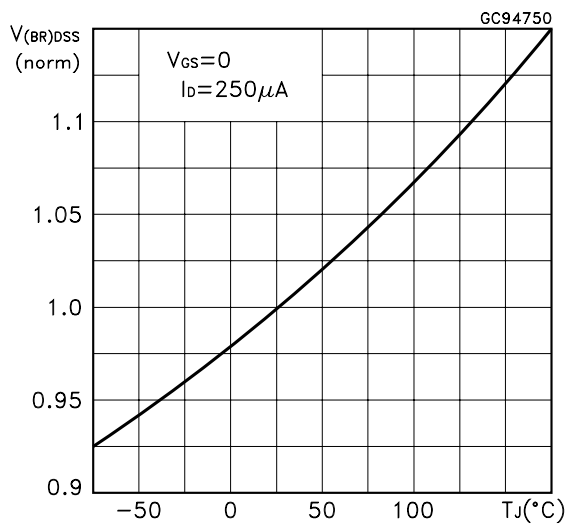


Fig. 1: Unclamped Inductive Load Test Circuit



Fig. 2: Unclamped Inductive Waveform



Fig. 3: Switching Times Test Circuits For Resistive Load



Fig. 4: Gate Charge test Circuit

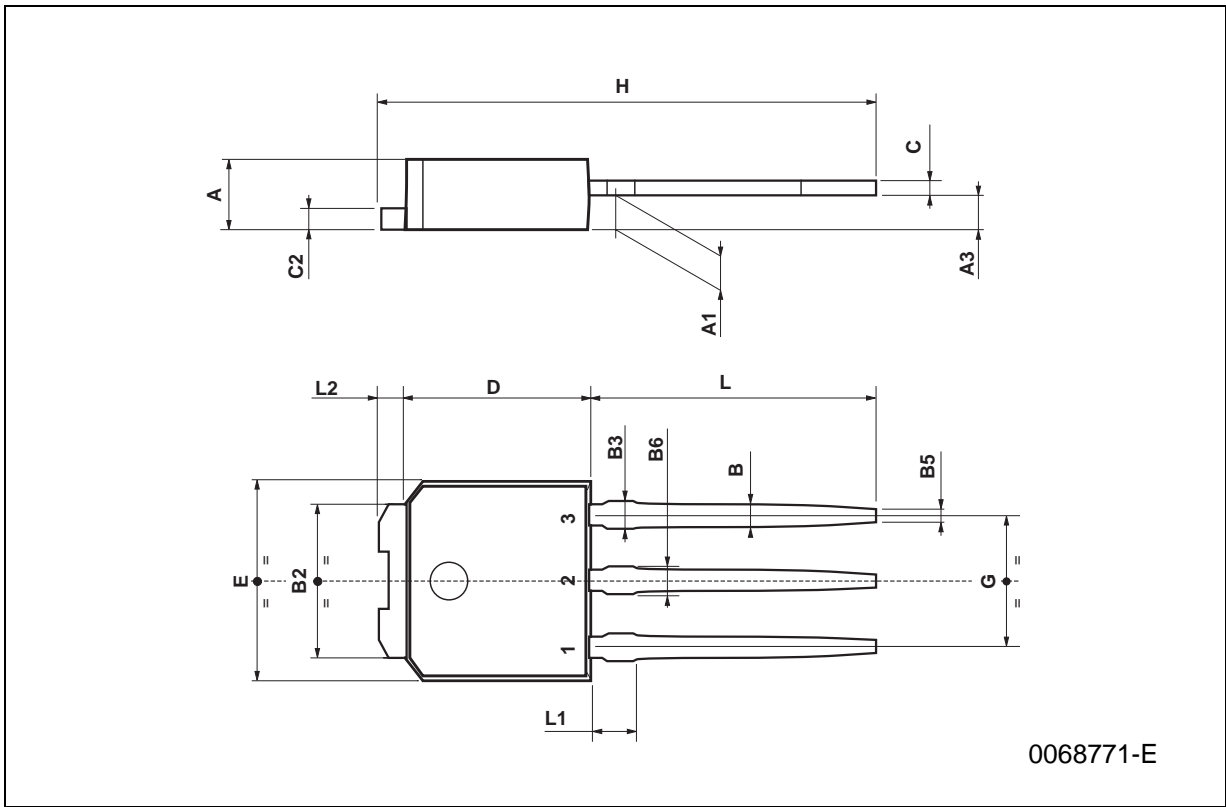


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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

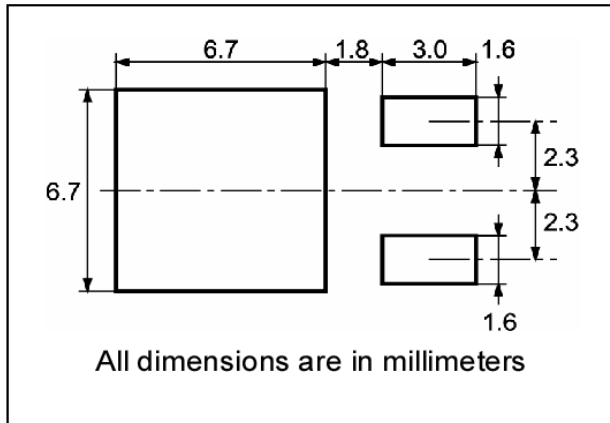


TO-252 (DPAK) MECHANICAL DATA

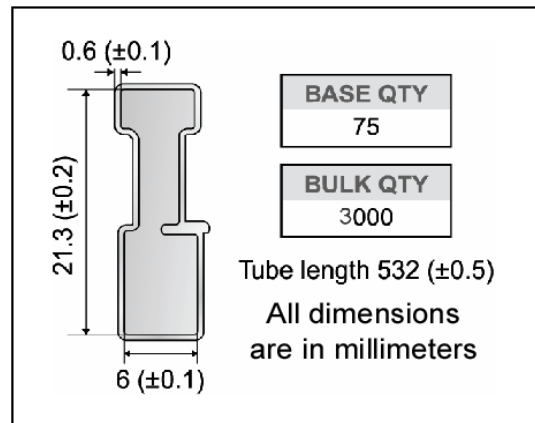
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L2		0.8			0.031	
L4	0.6		1	0.023		0.039



DPAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

Diagram showing the tape mechanical data. The tape has a width of A and a thickness of T. The distance from the center of the tape to the edge of the slot is B. The distance from the center of the tape to the edge of the hub is C. The distance from the center of the tape to the edge of the cavity is D. The distance from the center of the tape to the edge of the top cover tape is E. The distance from the center of the tape to the edge of the bottom cover tape is F. The distance from the center of the tape to the edge of the reel is G. The distance from the center of the tape to the edge of the reel is N. The distance from the center of the tape to the edge of the reel is T. The distance from the center of the tape to the edge of the reel is G measured at hub. The distance from the center of the tape to the edge of the reel is 40 mm min. Access hole at slot location. The distance from the center of the tape to the edge of the reel is Full radius. The distance from the center of the tape to the edge of the reel is Tape slot in core for tape start 2.5mm min. width.

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	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

BASE QTY	BULK QTY
1000	1000

TAPE MECHANICAL DATA

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 has a width of W and a thickness of T. The distance from the center of the tape to the edge of the slot is B0. The distance from the center of the tape to the edge of the hub is D. The distance from the center of the tape to the edge of the cavity is A0. The distance from the center of the tape to the edge of the top cover tape is P0. The distance from the center of the tape to the edge of the bottom cover tape is P1. The distance from the center of the tape to the edge of the reel is P2. The distance from the center of the tape to the edge of the reel is E. The distance from the center of the tape to the edge of the reel is F. The distance from the center of the tape to the edge of the reel is K0. The distance from the center of the tape to the edge of the reel is D. The distance from the center of the tape to the edge of the reel is B1. The distance from the center of the tape to the edge of the reel is T. The distance from the center of the tape to the edge of the reel is G measured at hub. The distance from the center of the tape to the edge of the reel is 40 mm min. Access hole at slot location. The distance from the center of the tape to the edge of the reel is Full radius. The distance from the center of the tape to the edge of the reel is Tape slot in core for tape start 2.5mm min. width.

*on sales type



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is registered trademark of STMicroelectronics
© 2002 STMicroelectronics - All Rights Reserved

All other names are the property of their respective owners.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco -
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>