



STD4LNK60Z STF4LNK60Z

N-channel 600 V, 2.2 Ω , 3.3 A, TO-220FP, DPAK
Zener-protected SuperMESH™ Power MOSFET

Preliminary Data

Features

Type	V _{DSS}	R _{DS(on)} max	I _D	P _w
STD4LNK60Z	600 V	< 2.7 Ω	3.3 A	70 W
STF4LNK60Z	600 V	< 2.7 Ω	3.3 A	25 W

- Extremely high dv/dt capability
- 100% avalanche tested
- Gate charge minimized
- Very low intrinsic capacitances
- Improved ESD capability

Application

- Switching applications

Description

The SuperMESH™ series is obtained through an extreme optimization of ST's well established strip-based PowerMESH™ layout. In addition to pushing on-resistance significantly down, special care is taken to ensure a very good dv/dt capability for the most demanding applications. Such series complements ST's full range of high voltage Power MOSFETs including revolutionary MDmesh™ products.

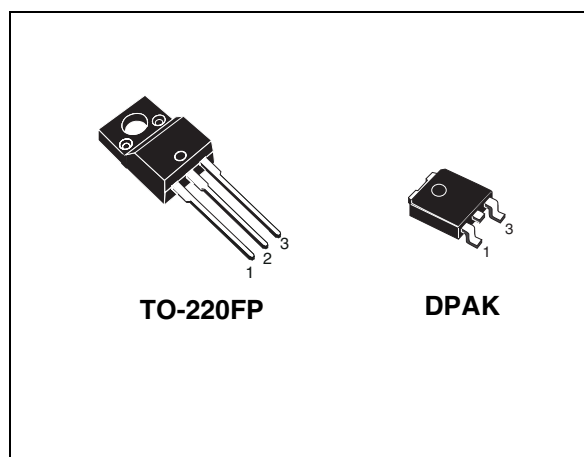


Figure 1. Internal schematic diagram

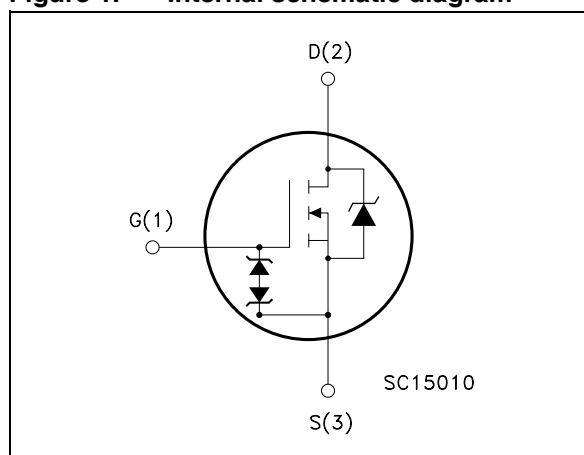


Table 1. Device summary

Order codes	Marking	Package	Packaging
STD4LNK60Z	4LNK60Z	DPAK	Tape and reel
STF4LNK60Z	4LNK60Z	TO-220FP	Tube

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		TO-220FP	DPAK	
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	600		V
V_{GS}	Gate-source voltage	± 30		V
I_D	Drain current (continuous) at $T_C = 25\text{ }^{\circ}\text{C}$	3.3 ⁽¹⁾	3.3	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	2 ⁽¹⁾	2	A
I_{DM}	Drain current (pulsed)	13.2 ⁽¹⁾	13.2	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^{\circ}\text{C}$	25	70	W
	Derating factor	0.2	0.56	W/ $^{\circ}\text{C}$
V_{ISO}	Insulation withstand voltage (RMS) from all three leads to external heat sink ($t=1\text{ s}; T_C=25\text{ }^{\circ}\text{C}$)	2500	--	V
T_j T_{stg}	Operating junction temperature Storage temperature	-55 to 150		$^{\circ}\text{C}$

1. Limited by package

Table 3. Thermal data

Symbol	Parameter	Value		Unit
		TO-220FP	DPAK	
$R_{thj-case}$	Thermal resistance junction-case	5	1.79	$^{\circ}\text{C}/\text{W}$
$R_{thj-pcb}$	Thermal resistance junction-pcb ⁽¹⁾	--	50	$^{\circ}\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-amb	62.5	--	$^{\circ}\text{C}/\text{W}$
T_l	Maximum lead temperature for soldering purpose	300		$^{\circ}\text{C}$

1. Minimum footprint

Table 4. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not repetitive (pulse width limited by T_{jmax})	TBD	A
E_{AS}	Single pulse avalanche energy ⁽¹⁾	TBD	mJ

1. Starting $T_j = 25\text{ }^{\circ}\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50\text{ V}$

2 Electrical characteristics

($T_{CASE}=25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 1\text{ mA}$, $V_{GS} = 0$	600			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = \text{Max rating}$, $V_{DS} = \text{Max rating}$, $T_C = 125\text{ }^{\circ}\text{C}$			1 50	μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 30\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 50\text{ }\mu\text{A}$	2	3	4	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\text{ V}$, $I_D = 2.7\text{ A}$		2.2	2.7	Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		400 50 10		pF pF pF
$C_{oss\text{ eq.}}$	Equivalent output capacitance	$V_{DS} = 0\text{ to }480\text{ V}$, $V_{GS} = 0$		44.4		pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	$V_{DD} = 480\text{ V}$, $I_D = 3.3\text{ A}$ $V_{GS} = 10\text{ V}$ (see Figure 3)		14 TBD TBD		nC nC nC

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Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	$V_{DD} = 300\text{ V}$, $I_D = 3.3\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 2)		7.5 19.5		ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	$V_{DD} = 300\text{ V}$, $I_D = 3.3\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 2)		28 24		ns ns

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Electrical characteristics

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current				3.3	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				13.2	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 3.3 \text{ A}$, $V_{GS} = 0$			TBD	V
t_{rr}	Reverse recovery time	$I_{SD} = 3.3 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$, $V_{DD} = 480 \text{ V}$, $T_j = 150^\circ\text{C}$ (see Figure 7)		TBD		ns
Q_{rr}	Reverse recovery charge			TBD		nC
I_{RRM}	Reverse recovery current			TBD		A

1. Pulse width limited by package
2. Pulsed: pulse duration = 300 μs , duty cycle 1.5%

3 Test circuits

Figure 2. Switching times test circuit for resistive load

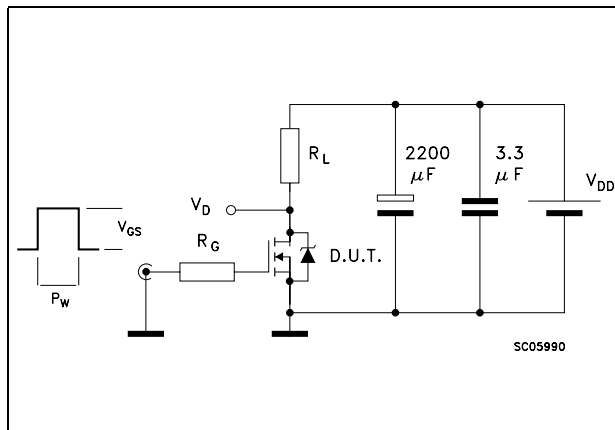


Figure 3. Gate charge test circuit

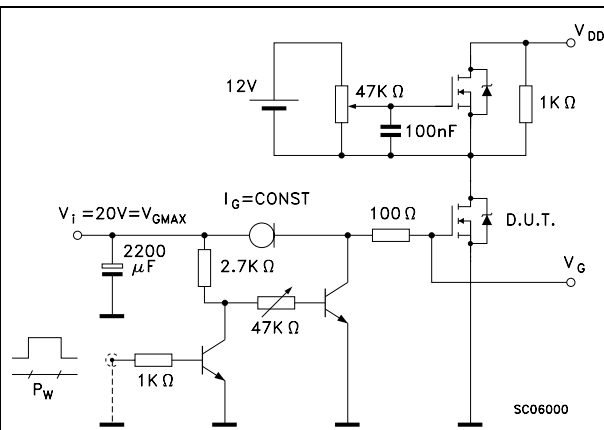


Figure 4. Test circuit for inductive load switching and diode recovery times

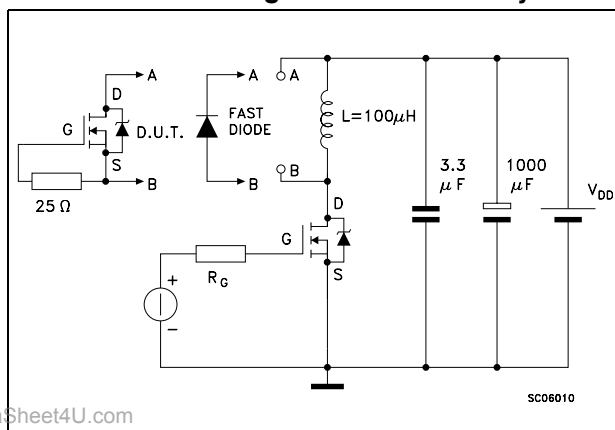


Figure 5. Unclamped inductive load test circuit

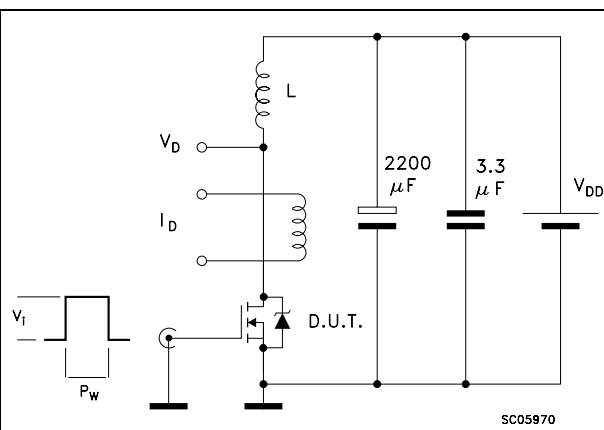


Figure 6. Unclamped inductive waveform

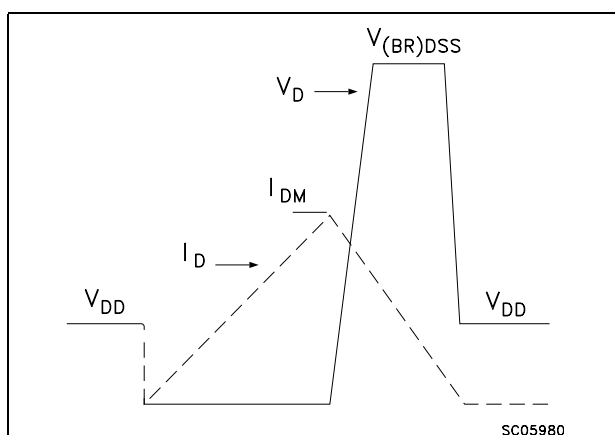
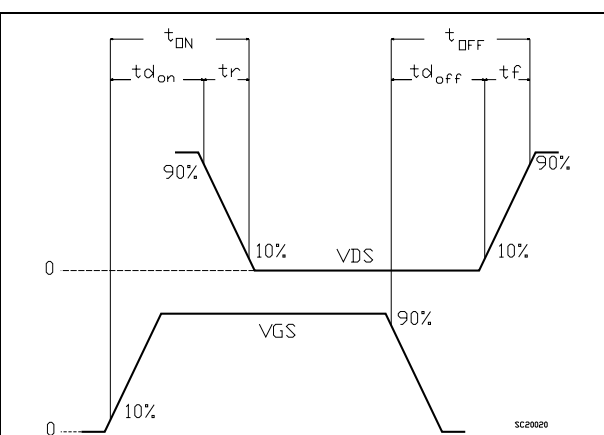


Figure 7. Switching time waveform



4 Package mechanical data

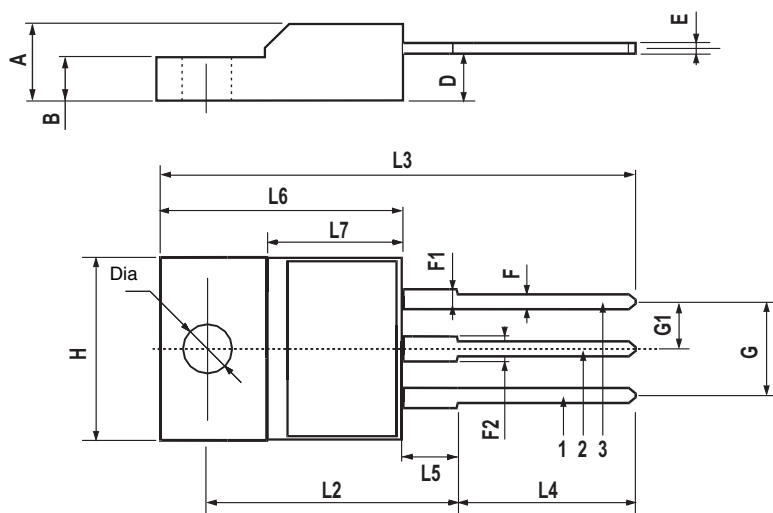
In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

Package mechanical data

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TO-220FP mechanical data

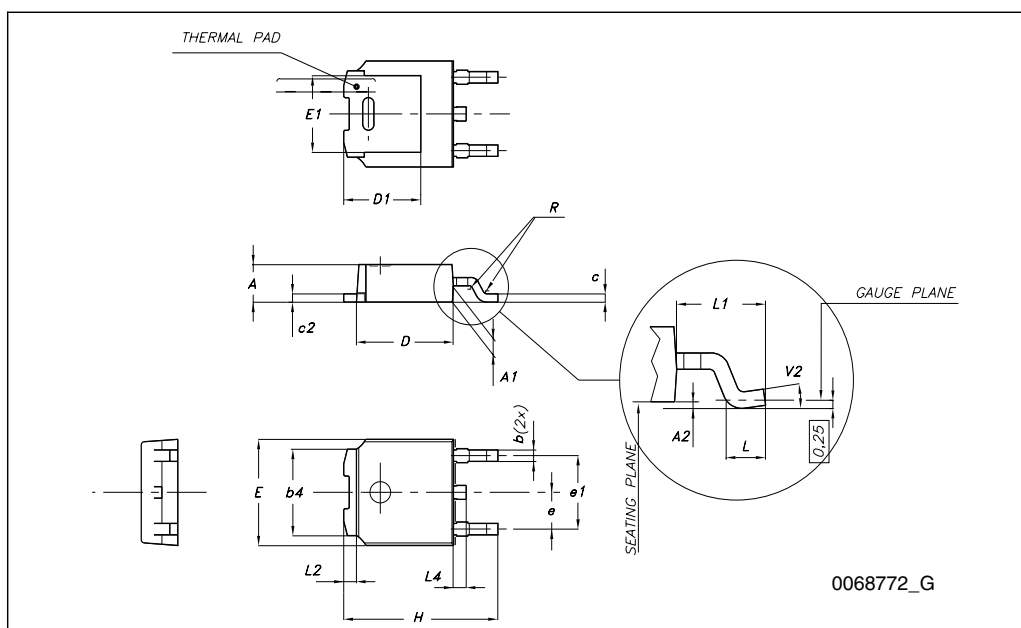
Dim.	mm.			inch		
	Min.	Typ	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.017		0.027
F	0.75		1.00	0.030		0.039
F1	1.15		1.50	0.045		0.067
F2	1.15		1.50	0.045		0.067
G	4.95		5.20	0.195		0.204
G1	2.40		2.70	0.094		0.106
H	10		10.40	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.80		10.60	0.385		0.417
L5	2.9		3.6	0.114		0.141
L6	15.90		16.40	0.626		0.645
L7	9		9.30	0.354		0.366
Dia	3		3.2	0.118		0.126



7012510-I

TO-252 (DPAK) mechanical data

DIM.	mm.		
	min.	typ	max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
H	9.35		10.10
L	1		
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0°		8°



5 Revision history

Table 9. Document revision history

Date	Revision	Changes
24-Jul-2008	1	Initial release.

STD4LNK60Z - STF4LNK60Z

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