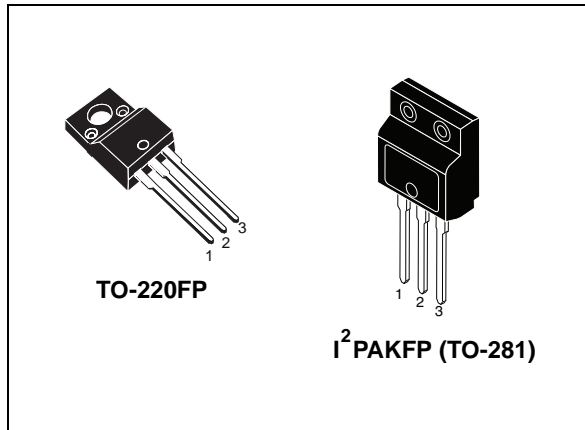


## N-channel 600 V, 0.145 $\Omega$ typ., 20 A MDmesh™ M2 Power MOSFETs in TO-220FP and I<sup>2</sup>PAKFP packages

Datasheet - preliminary data



### Features

Order code	V <sub>DS</sub> @ T <sub>Jmax</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
STF26N60M2	650 V	0.165 $\Omega$	20 A
STFI26N60M2			

- Extremely low gate charge
- Excellent output capacitance (C<sub>oss</sub>) profile
- 100% avalanche tested
- Zener-protected

### Applications

- Switching applications
- L<sub>CC</sub> converters, resonant converters

### Description

These devices are N-channel Power MOSFETs developed using MDmesh™ M2 technology. Thanks to their strip layout and improved vertical structure, the devices exhibit low on-resistance and optimized switching characteristics, rendering them suitable for the most demanding high efficiency converters.

Figure 1. Internal schematic diagram

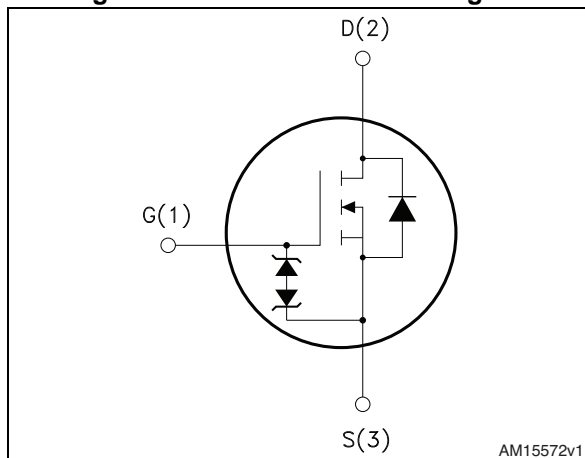


Table 1. Device summary

Order code	Marking	Package	Packaging
STF26N60M2	26N60M2	TO-220FP	Tube
STFI26N60M2		I <sup>2</sup> PAKFP (TO-281)	

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{GS}$	Gate-source voltage	$\pm 25$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	20 <sup>(1)</sup>	A
$I_D$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	13 <sup>(1)</sup>	A
$I_{DM}^{(2)}$	Drain current (pulsed)	80 <sup>(1)</sup>	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	30	W
$dv/dt^{(3)}$	Peak diode recovery voltage slope	15	V/ns
$dv/dt^{(4)}$	MOSFET $dv/dt$ ruggedness	50	V/ns
$V_{ISO}$	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
$T_{stg}$	Storage temperature	- 55 to 150	$^\circ\text{C}$
$T_j$	Operating junction temperature		

- Limited by maximum junction temperature.
- Pulse width limited by safe operating area.
- $I_{SD} \leq 22\text{ A}$ ,  $di/dt \leq 400\text{ A}/\mu\text{s}$ ;  $V_{DS\text{ peak}} < V_{(BR)DSS}$ ,  $V_{DD} = 400\text{ V}$ .
- $V_{DS} \leq 480\text{ V}$

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	4.2	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-ambient max	62.5	$^\circ\text{C}/\text{W}$

**Table 4. Avalanche characteristics**

Symbol	Parameter	Value	Unit
$I_{AR}$	Avalanche current, repetitive or not repetitive (pulse width limited by $T_{jmax}$ )	3.8	A
$E_{AS}$	Single pulse avalanche energy (starting $T_j = 25\text{ }^\circ\text{C}$ , $I_D = I_{AR}$ ; $V_{DD} = 50\text{ V}$ )	250	mJ

## 2 Electrical characteristics

( $T_C = 25\text{ °C}$  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 ( $V_{GS} = 0$ )	$V_{DS} = 600\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 600\text{ V}$ , $T_C = 125\text{ °C}$			100	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 25\text{ V}$			$\pm 10$	$\mu\text{A}$
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2	3	4	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 11\text{ A}$		0.145	0.165	$\Omega$

**Table 6. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 100\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0$	-	TBD	-	pF
$C_{oss}$	Output capacitance		-	TBD	-	pF
$C_{riss}$	Reverse transfer capacitance		-	TBD	-	pF
$C_{oss\text{ eq.}}^{(1)}$	Equivalent output capacitance	$V_{DS} = 0\text{ to }480\text{ V}$ , $V_{GS} = 0$	-	TBD	-	pF
$R_G$	Intrinsic gate resistance	$f = 1\text{ MHz}$ open drain	-	TBD	-	$\Omega$
$Q_g$	Total gate charge	$V_{DD} = 480\text{ V}$ , $I_D = 22\text{ A}$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 15</a> )	-	TBD	-	nC
$Q_{gs}$	Gate-source charge		-	TBD	-	nC
$Q_{gd}$	Gate-drain charge		-	TBD	-	nC

1.  $C_{oss\text{ eq.}}$  is defined as a constant equivalent capacitance giving the same charging time as  $C_{oss}$  when  $V_{DS}$  increases from 0 to 80%  $V_{DSS}$

**Table 7. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 300\text{ V}$ , $I_D = 11\text{ A}$ , $R_G = 4.7\text{ }\Omega$ , $V_{GS} = 10\text{ V}$ (see <a href="#">Figure 14</a> and <a href="#">Figure 19</a> )	-	TBD	-	ns
$t_r$	Rise time		-	TBD	-	ns
$t_{d(off)}$	Turn-off delay time		-	TBD	-	ns
$t_f$	Fall time		-	TBD	-	ns

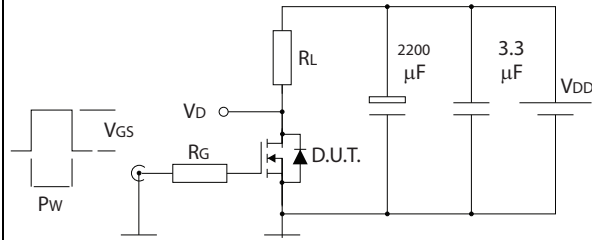
Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		20	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		80	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 22\text{ A}$ , $V_{GS} = 0$	-		1.6	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 22\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 60\text{ V}$ (see <a href="#">Figure 19</a> )	-	TBD		ns
$Q_{rr}$	Reverse recovery charge		-	TBD		$\mu\text{C}$
$I_{RRM}$	Reverse recovery current		-	TBD		A
$t_{rr}$	Reverse recovery time	$I_{SD} = 22\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 60\text{ V}$ , $T_j = 150\text{ }^\circ\text{C}$ (see <a href="#">Figure 19</a> )	-	TBD		ns
$Q_{rr}$	Reverse recovery charge		-	TBD		$\mu\text{C}$
$I_{RRM}$	Reverse recovery current		-	TBD		A

1. Pulse width limited by safe operating area.
2. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

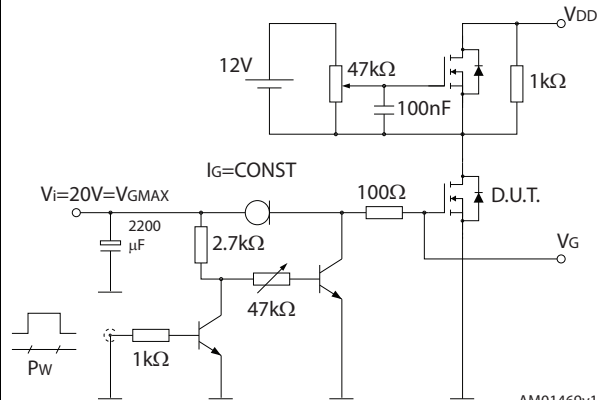
### 3 Test circuits

**Figure 2. Switching times test circuit for resistive load**



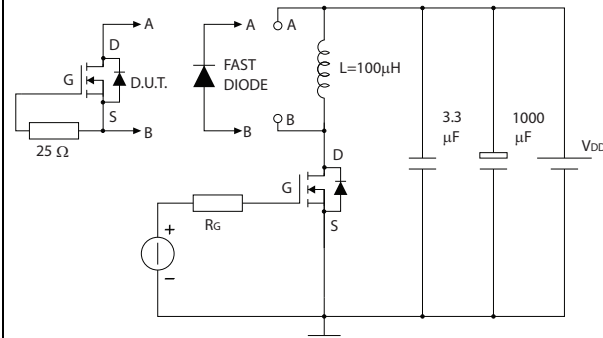
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**Figure 3. Gate charge test circuit**



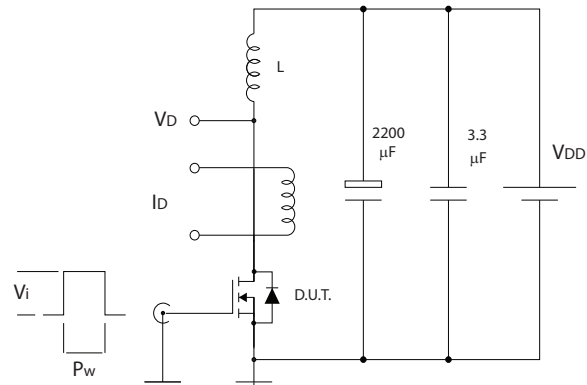
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**Figure 4. Test circuit for inductive load switching and diode recovery times**



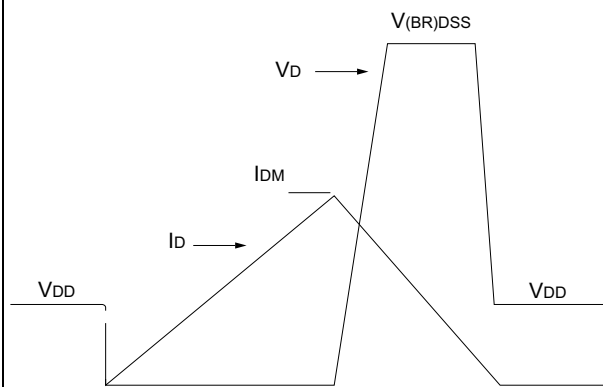
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**Figure 5. Unclamped inductive load test circuit**



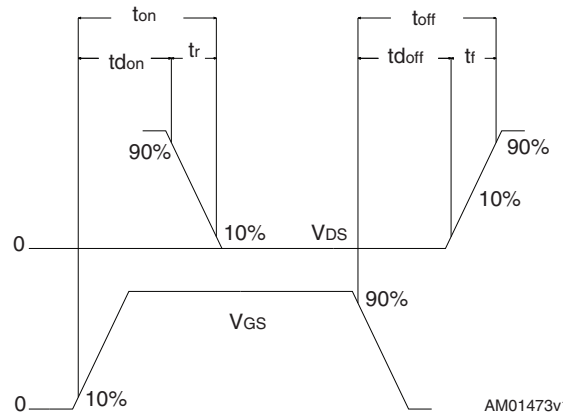
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**Figure 6. Unclamped inductive waveform**



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**Figure 7. switching time waveform**



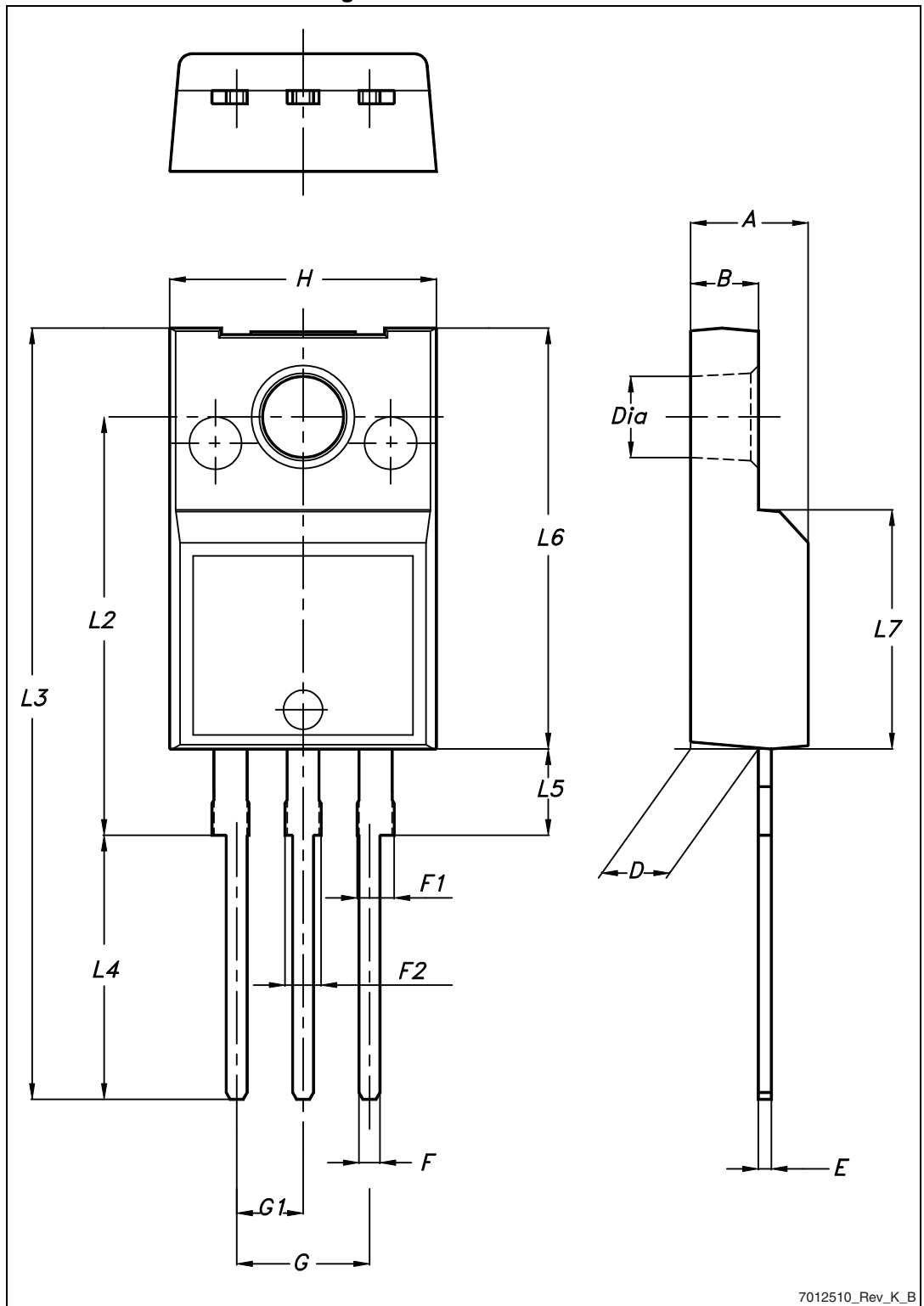
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## 4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

### 4.1 TO-220FP package information

Figure 8. TO-220FP outline



7012510\_Rev\_K\_B

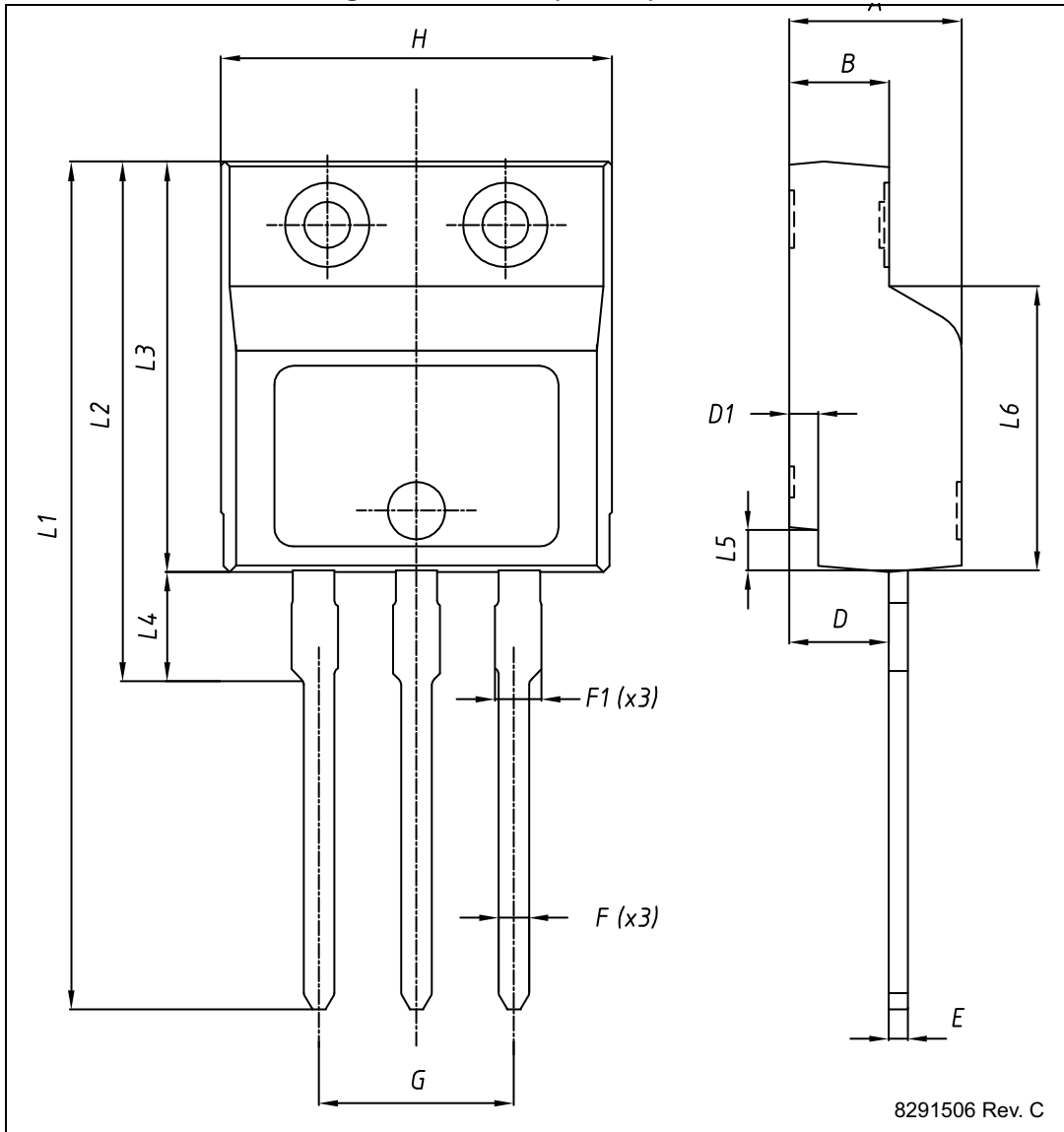


Table 9. TO-220FP mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.70
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2

### 4.2 I<sup>2</sup>PAK (TO-281) package information

Figure 9. I<sup>2</sup>PAKFP (TO-281) outline



8291506 Rev. C

Table 10. I<sup>2</sup>PAKFP (TO-281) mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
B	2.50		2.70
D	2.50		2.75
D1	0.65		0.85
E	0.45		0.70
F	0.75		1.00
F1			1.20
G	4.95		5.20
H	10.00		10.40
L1	21.00		23.00
L2	13.20		14.10
L3	10.55		10.85
L4	2.70		3.20
L5	0.85		1.25
L6	7.50	7.60	7.70

## 5 Revision history

Table 11. Document revision history

Date	Revision	Changes
30-Mar-2015	1	First release.

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