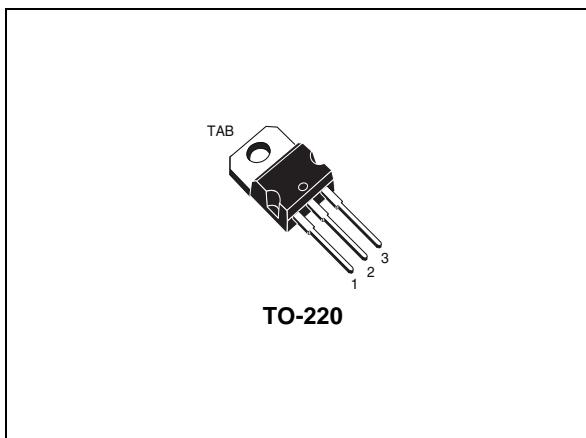
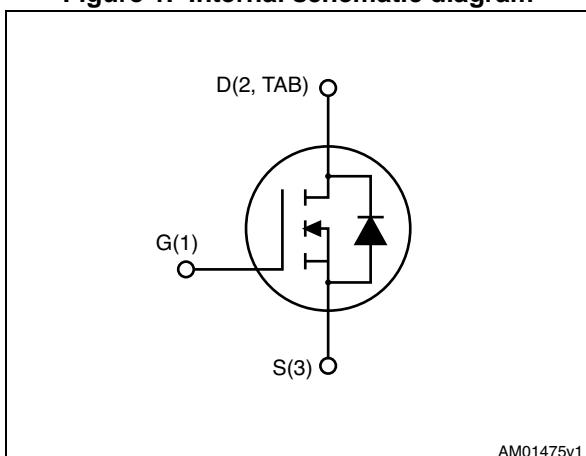


**N-channel 30 V, 2.7 mΩ typ., 150 A, STripFET™ VI DeepGATE™ Power MOSFET in a TO-220 package**

Datasheet – production data



**Figure 1. Internal schematic diagram**



## Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STP105N3LL	30 V	3.5 mΩ	150 A

- R<sub>DS(on)</sub> \* Q<sub>g</sub> industry benchmark
- Extremely low on-resistance R<sub>DS(on)</sub>
- High avalanche ruggedness
- Low gate drive power losses

## Applications

- Switching applications

## Description

This device is an N-channel Power MOSFET developed using the 6<sup>th</sup> generation of STripFET™ DeepGATE™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest R<sub>DS(on)</sub> in all packages.

**Table 1. Device summary**

Order code	Marking	Packages	Packaging
STP105N3LL	105N3LL	TO-220	Tube

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	30	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Continuous drain current at $T_C = 25^\circ\text{C}$ (silicon limited)	150	A
$I_D$	Continuous drain current at $T_C = 100^\circ\text{C}$ (silicon limited)	105	A
$I_D$	Continuous drain current at $T_C = 25^\circ\text{C}$ (package limited)	80	A
$I_{DM}^{(1)}$	Pulsed drain current	320	A
$P_{TOT}$	Total dissipation at $T_C = 25^\circ\text{C}$	140	W
	Derating factor	0.9	W/ $^\circ\text{C}$
$E_{AS}^{(2)}$	Single pulse avalanche energy	150	mJ
$T_{stg}$	Storage temperature	-55 to 175	$^\circ\text{C}$
$T_j$	Max. operating junction temperature	175	$^\circ\text{C}$

1. Pulse width limited by safe operating area

2. Starting  $T_j = 25^\circ\text{C}$ ,  $I_{AV} = 40 \text{ A}$

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	1.1	$^\circ\text{C/W}$
$R_{thj-amb}$	Thermal resistance junction-ambient max	62.5	$^\circ\text{C/W}$

## 2 Electrical characteristics

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

**Table 4. Static**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0$	30			V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = 30 \text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 30 \text{ V}, T_c = 125^\circ\text{C}$			10	$\mu\text{A}$
$I_{GSS}$	Gate body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 20 \text{ V}$			$\pm 100$	nA
$V_{GS(\text{th})}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	1		2.5	V
$R_{DS(\text{on})}$	Static drain-source on-resistance	$V_{GS} = 10 \text{ V}, I_D = 40 \text{ A}$		2.7	3.5	$\text{m}\Omega$
		$V_{GS} = 4.5 \text{ V}, I_D = 40 \text{ A}$		3.5	4.5	$\text{m}\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25 \text{ V}, f=1 \text{ MHz}, V_{GS} = 0$	-	3500	-	pF
$C_{oss}$	Output capacitance		-	400	-	pF
$C_{rss}$	Reverse transfer capacitance		-	380	-	pF
$Q_g$	Total gate charge	$V_{DD} = 15 \text{ V}, I_D = 80 \text{ A}$ $V_{GS} = 4.5 \text{ V}$	-	42	-	nC
$Q_{gs}$	Gate-source charge		-	9	-	nC
$Q_{gd}$	Gate-drain charge		-	18	-	nC
$R_g$	Gate input resistance	$f = 1 \text{ MHz}, \text{gate DC Bias} = 0,$ test signal level = 20 mV, $I_D = 0$	-	1	-	$\Omega$

**Table 6. Switching on/off (inductive load)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15 \text{ V}, I_D = 40 \text{ A}, R_G = 4.7 \Omega, V_{GS} = 5 \text{ V}$	-	19	-	ns
$t_r$	Rise time		-	91	-	ns
$t_{d(off)}$	Turn-off delay time		-	24.5	-	ns
$t_f$	Fall time		-	23.4	-	ns

**Table 7. Source drain diode**

<b>Symbol</b>	<b>Parameter</b>	<b>Test conditions</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
$I_{SD}$	Source-drain current		-		80	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		320	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 40 \text{ A}, V_{GS} = 0$	-		1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 80 \text{ A},$ $dI/dt = 100 \text{ A}/\mu\text{s},$ $V_{DD} = 24 \text{ V}$	-	28.6		ns
$Q_{rr}$	Reverse recovery charge		-	22.8		nC
$I_{RRM}$	Reverse recovery current		-	1.6		A

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

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

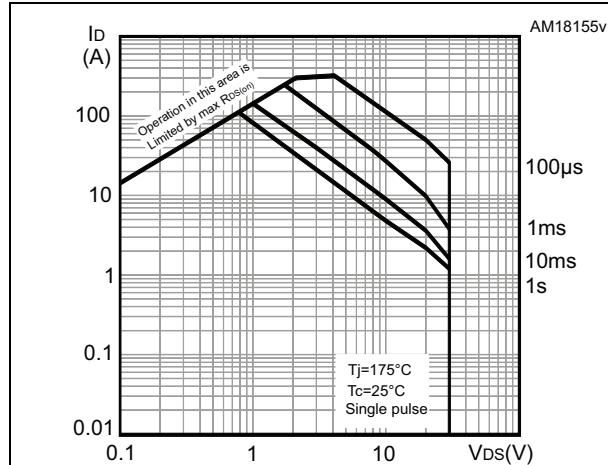


Figure 3. Thermal impedance

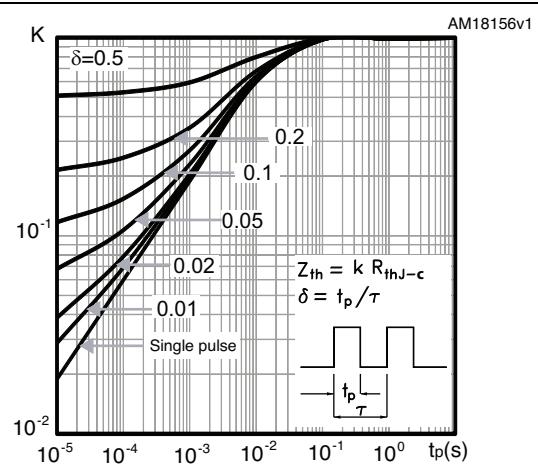


Figure 4. Output characteristics

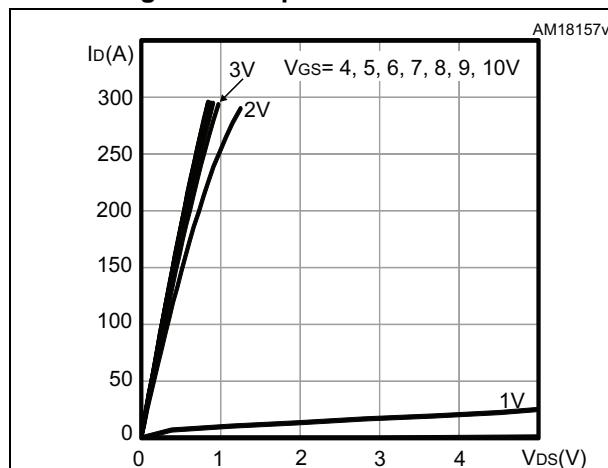


Figure 5. Transfer characteristics

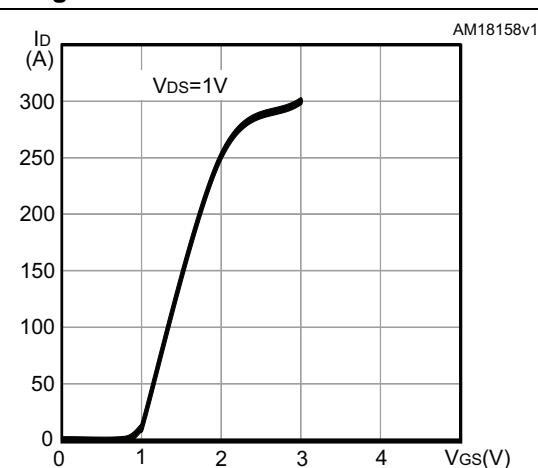


Figure 6. Gate charge vs gate-source voltage

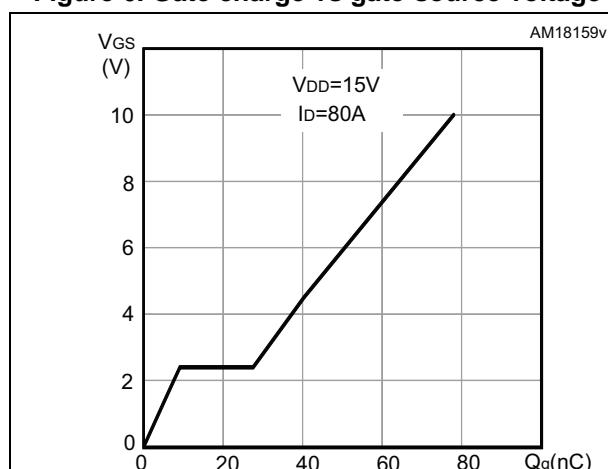


Figure 7. Static drain-source on-resistance

