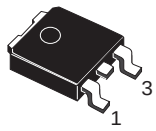
STD16NF06

N-Channel 60V - 0.060Ω - 16A - DPAK
STripFET™ II Power MOSFET

General features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STD16NF06	60V	<0.070Ω	16A

- Typical $R_{DS(on)}$ = 0.060Ω
- Exceptional dv/dt Capability
- 100% Avalanche Tested
- Application Oriented Characterization

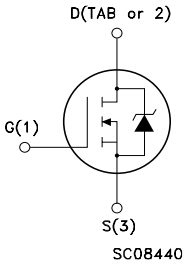


DPAK
TO-252

Description

This Power MOSFET is the latest development of STMicroelectronis 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

Internal schematic diagram



Applications

- Audio Amplifiers
- Power Tools
- Automotive Environment

Order codes

Part Number	Marking	Package	Packaging
STD16NF06T4	D16NF06	TO-252	TAPE & REEL

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0V)	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	16	A
I_D	Drain Current (continuous) at T_C = 100°C	11	A
I_{DM} *Note 4*	Drain Current (pulsed)	64	A
P_{TOT}	Total Dissipation at T_C = 25°C	40	W
	Derating Factor	0.27	W/°C
dv/dt	Peak Diode Recovery voltage slope	10.5	V/ns
EAS	Single Pulse Avalanche Energy	178	mJ
T_J T_{stg}	Operating Junction Temperature Storage Temperature	-55 to 175	°C

Table 2. Thermal data

R_{thJC}	Thermal Resistance Junction-case Max	3.75	°C/W
R_{thJA}	Thermal Resistance Junction-amb Max	100	°C/W
T_l	Maximum Lead Temperature For Soldering Purpose	275	°C

2 Electrical characteristics

(T_{CASE} = 25 °C unless otherwise specified)

Table 3. On/off states

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250µA 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} = ±20V			±100	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} I_D = 250µA	2			V
$R_{DS(on)}$	Static Drain-Source On Resistance	V_{GS} = 10V I_D = 8A		0.060	0.070	Ω

Table 4. Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} *Note 5*	Forward Transconductance	V_{DS} = 25V I_D = 8A		6		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 15V, f = 1MHz, V_{GS} = 0		400 103 41.5		pF pF pF
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} =30 I_D = 16A V_{GS} =10V *Figure 14 on page 7*		14.1 2.8 5.4		nC nC nC

Table 5. Switching times

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	V_{DD} = 30V, I_D = 8A, R_G = 4.7Ω, V_{GS} = 10V *Figure 13 on page 7*		4 15		ns ns
$t_{d(off)}$ t_f	Off voltage Rise Time FallTime	V_{DD} = 30V, I_D = 8A, R_G = 4.7Ω, V_{GS} = 10V *Figure 15 on page 7*		16 5.5		ns ns

Table 6. Source drain diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} *Note 4*	Source-drain Current Source-drain Current (pulsed)				16 64	A A
V_{SD} *Note 5*	Forward on Voltage	I_{SD} = 8A V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 16A, di/dt = 100A/µs, V_{DD} = 20V, T_J =150°C *Figure 15 on page 7*		49 78 3.2		ns µC A

Note: 1 Value limited by wire bonding

2 Garanted when external Rg=4.7 Ω and $t_f < t_{fmax}$.

3 Starting T_J = 25°C, I_D = 19A, V_{DD} = 18V

4 Pulse width limited by safe operating area

5 Pulsed: pulse duration = 300µs, duty cycle 1.5%

2.1 Electrical chraracteristics (curves)

Figure 1. Safe Operating Area

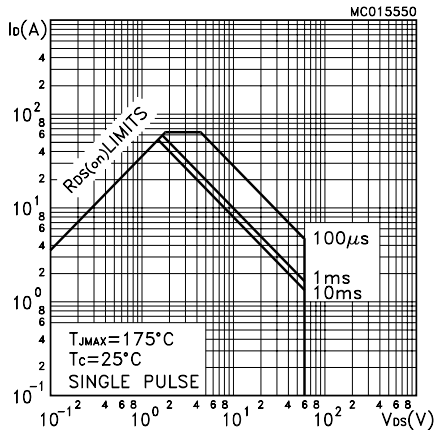


Figure 2. Thermal Impedance

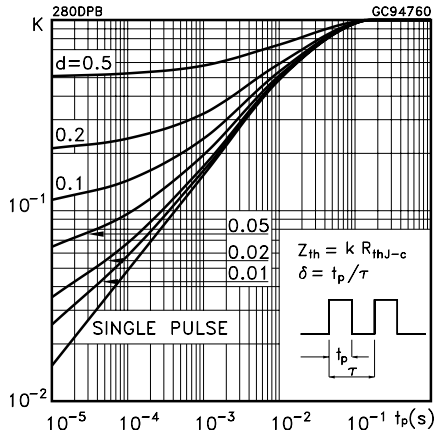


Figure 3. Output Characteristics

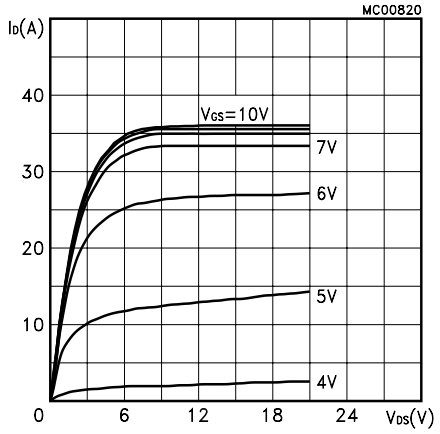


Figure 4. Transfer Characteristics

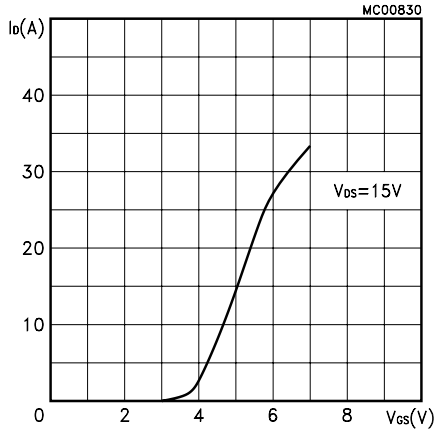


Figure 5. Transconductance

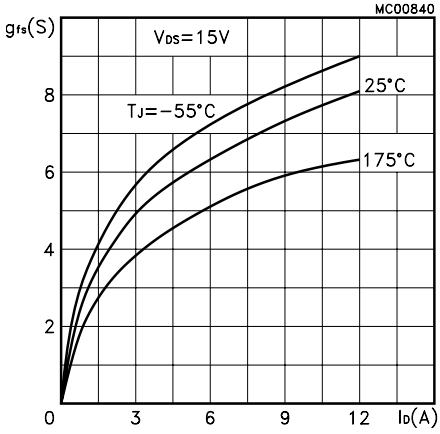


Figure 6. Static Drain-Source on Resistance

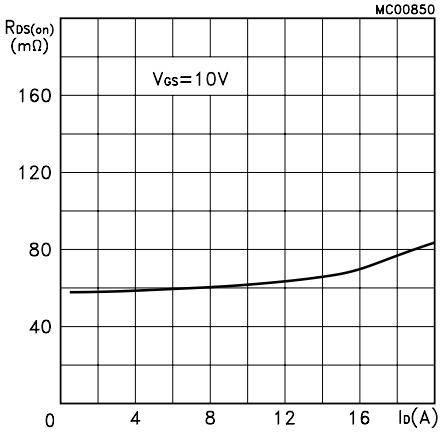


Figure 7. Gate Charge vs Gate-Source Voltage

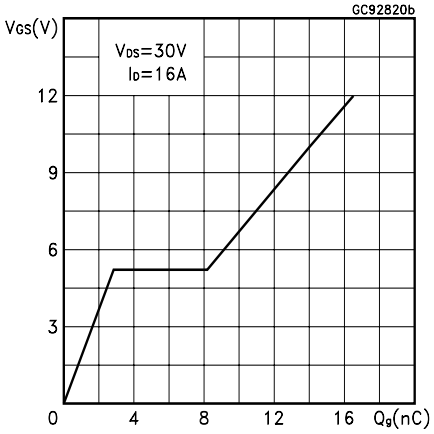


Figure 8. Capacitance Variations

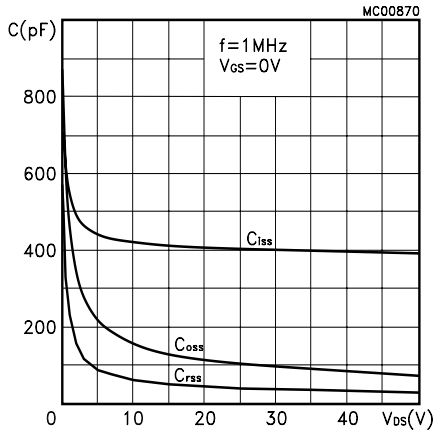


Figure 9. Normalized Gate Threshold Voltage vs Temperature

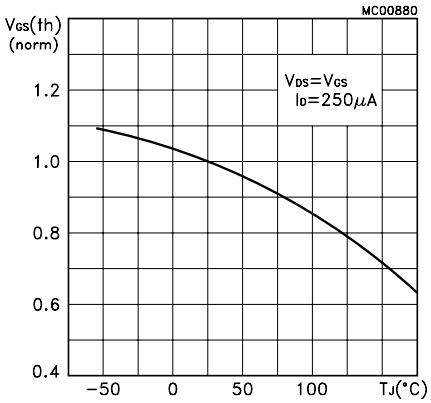


Figure 10. Normalized on Resistance vs Temperature

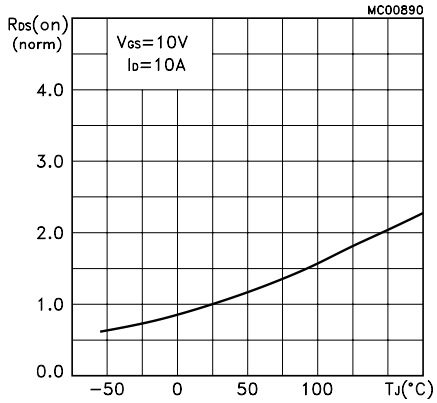


Figure 11. Source-drain Diode Forward Characteristics

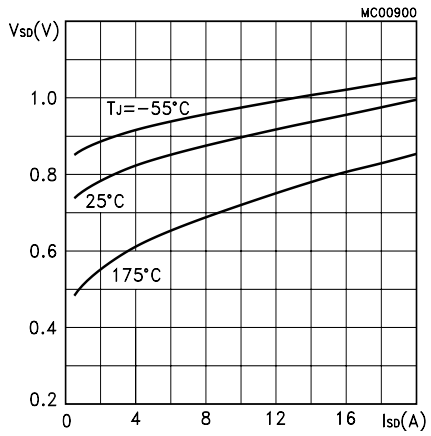
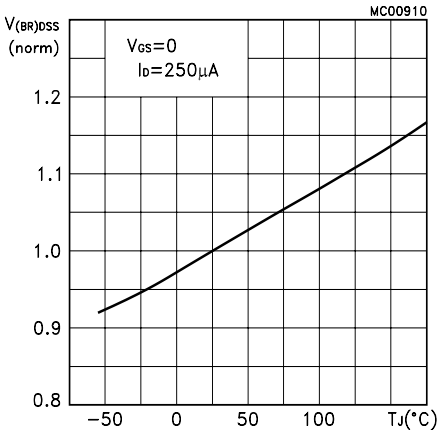


Figure 12. Normalized Breakdown Voltage vs Temperature



3 Test circuits

Figure 13. Switching Times Test Circuit For Resistive Load

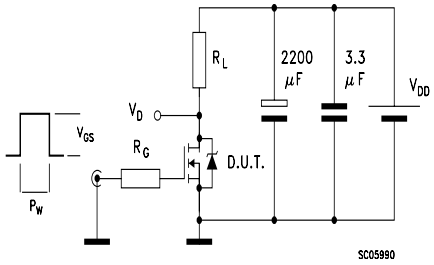


Figure 14. Gate Charge Test Circuit

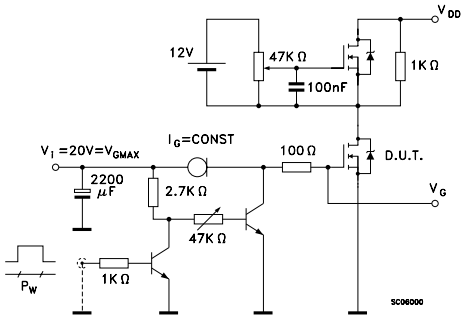


Figure 15. Test Circuit For Inductive Load Switching and Diode Recovery Times

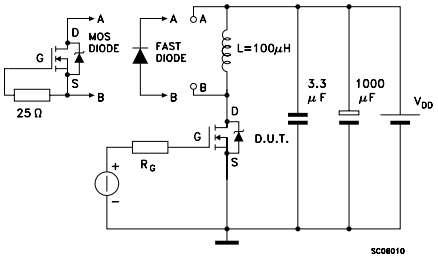


Figure 17. Unclamped Inductive Load Test Circuit

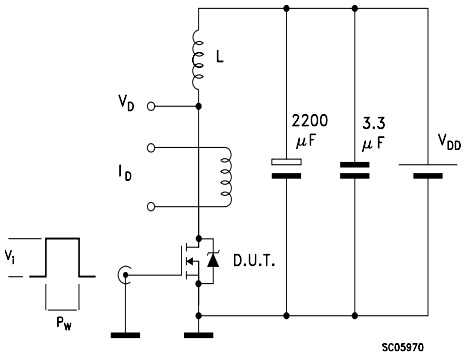
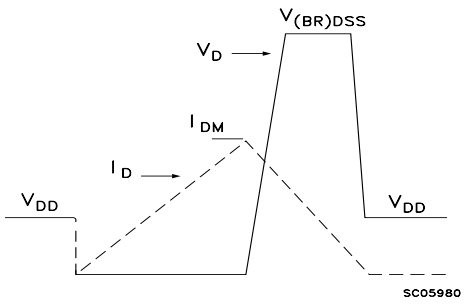


Figure 16. Unclamped Inductive Waveform

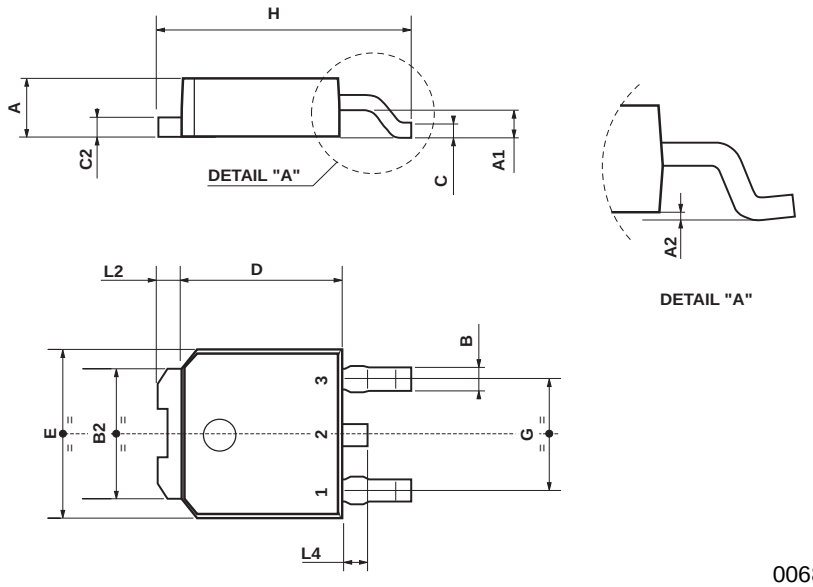


4 Package mechanical data

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

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



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5 Revision History

Date	Revision	Description of changes
10-Jan-2006	1	First release