

STD16NF06

General features

Туре	V _{DSS}	R _{DS(on)}	I _D
STD16NF06	60V	< 0.070Ω	16A

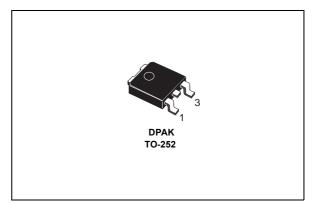
- Typical R_{DS(on)} = 0.060Ω
- Exceptional dv/dt Capability
- 100% Avalanche Tested
- Application Oriented Characterization

Description

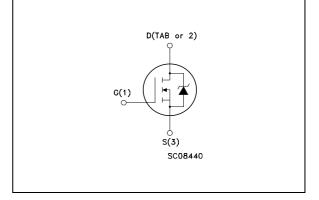
This Power MOSFET is the latest development of STMicroelectronis unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

Applications

- Audio Amplifiers
- Power Tools
- Automotive Environment



Internal schematic diagram



Order codes

Part Number	Marking	Package	Packaging
STD16NF06T4	D16NF06	TO-252	TAPE & REEL
January 2006			Rev 1 1/11
			www.st.com

1 Electrical ratings

Parameter	Value	Unit
Drain-source Voltage (V _{GS} = 0V)	60	V
Drain-gate Voltage (R_{GS} = 20 k Ω)	60	V
Gate-Source Voltage	± 20	V
Drain Current (continuous) at T _C = 25°C	16	А
Drain Current (continuous) at T _C = 100°C	11	А
Drain Current (pulsed)	64	A
Total Dissipation at $T_{C} = 25^{\circ}C$	40	W
Derating Factor	0.27	W/°C
Peak Diode Recovery voltage slope	10.5	V/ns
Single Pulse Avalanche Energy	178	mJ
Operating Junction Temperature Storage Temperature	-55 to 175	°C
	Drain-source Voltage ($V_{GS} = 0V$)Drain-gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)Gate-Source VoltageDrain Current (continuous) at $T_C = 25^{\circ}C$ Drain Current (continuous) at $T_C = 100^{\circ}C$ Drain Current (pulsed)Total Dissipation at $T_C = 25^{\circ}C$ Derating FactorPeak Diode Recovery voltage slopeSingle Pulse Avalanche EnergyOperating Junction Temperature	Drain-source Voltage ($V_{GS} = 0V$)60Drain-gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)60Gate-Source Voltage ± 20 Drain Current (continuous) at $T_C = 25^{\circ}C$ 16Drain Current (continuous) at $T_C = 100^{\circ}C$ 11Drain Current (pulsed)64Total Dissipation at $T_C = 25^{\circ}C$ 40Derating Factor0.27Peak Diode Recovery voltage slope10.5Single Pulse Avalanche Energy178Operating Junction Temperature-55 to 175

Table 1. Absolute maximum ratings

Table 2.	i nermal data		
R _{thJC}	Thermal Resistance Junction-case Max	3.75	°C/W
R _{thJA}	Thermal Resistance Junction-amb Max	100	°C/W
TI	Maximum Lead Temperature For Soldering Purpose	275	°C



2 Electrical characteristics

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

Symbol	Parameter	Test Cond	itions	Min.	Тур.	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				1 10	μΑ μΑ
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.	Тур.	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.	Тур.	Max.	Unit
t _{d(on)} t _r	Turn-on Delay Time Rise Time	$V_{DD} = 30V$, $I_D = 8A$, $R_G = 4.7\Omega$, $V_{GS} = 10V$ <i>Figure 13 on page 7</i>		4 15		ns ns
t _{d(off)} t _f	Off voltage Rise Time FallTime	$V_{DD} = 30V, I_D = 8A,$ $R_G = 4.7\Omega, V_{GS} = 10V$ <i>Figure 15 on page 7</i>		16 5.5		ns ns

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Table 6.Source drain diode

Symbol	Parameter	Test Conditions	Min.	Тур.	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, Τ _J =150°C <i>Figure 15 on page 7</i>		49 78 3.2		ns μC Α

Note: 1 Value limited by wire bonding

- 2 Garanted when external Rg=4.7 Ω and t_{f} < $t_{fmax}.$
- 3 Starting $T_J = 25^{\circ}C$, $I_D = 19A$, $V_{DD} = 18V$
- 4 Pulse width limited by safe operating area
- 5 Pulsed: pulse duration = 300µs, duty cycle 1.5%

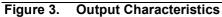


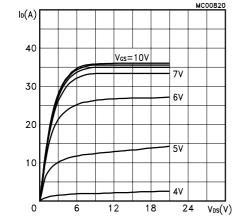
Figure 1.

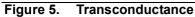
2.1 Electrical chraracteristics (curves)

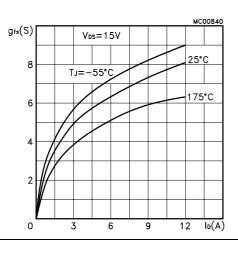
$I_{D}(A)$

Safe Operating Area

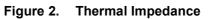








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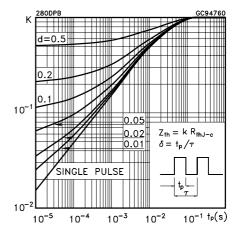


Figure 4. Transfer Characteristics

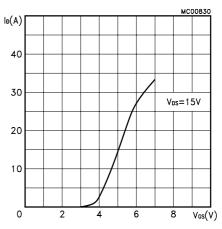
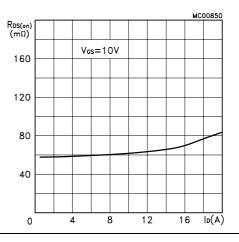
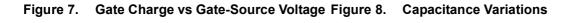


Figure 6. Static Drain-Source on Resistance





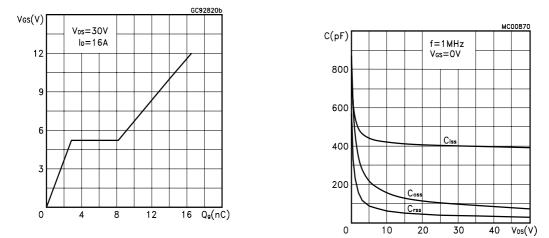


Figure 9. Normalized Gate Threshold Voltage Figure 10. Normalized on Resistance vs vs Temperature Temperature

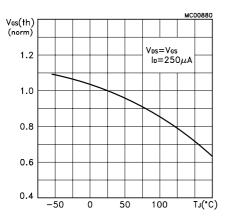
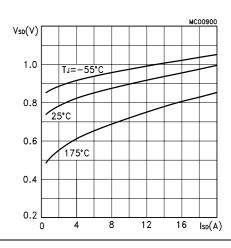
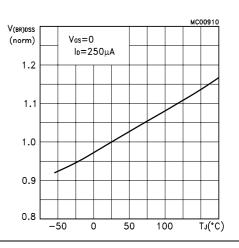


Figure 11. Source-drain Diode Forward **Characteristics**

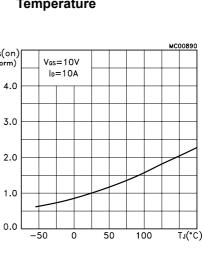


R₀s(on) Vcs=10V (norm) ID=10A 4.0 3.0 2.0 1.0 0.0 -50 0 50 100

Figure 12. Normalized Breakdown Voltage vs Temperature



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3 Test circuits

Figure 13. Switching Times Test Circuit For Resistive Load

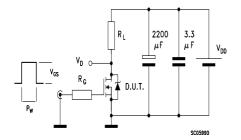


Figure 15. Test Circuit For Inductive Load Switching and Diode Recovery Times

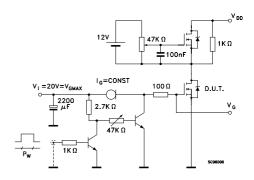
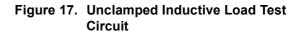


Figure 14. Gate Charge Test Circuit



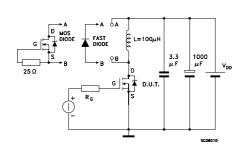
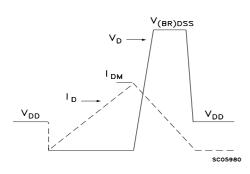
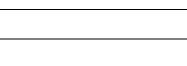


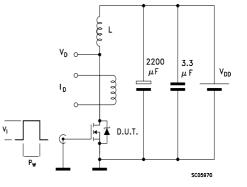
Figure 16. Unclamped Inductive Waveform







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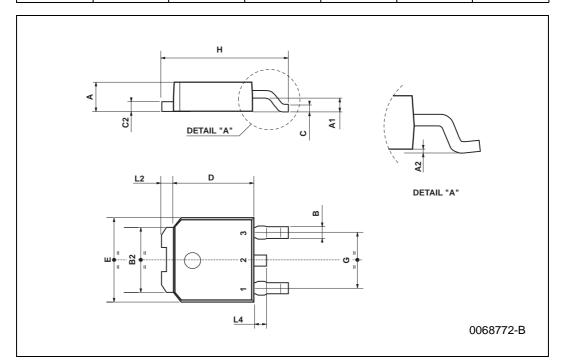
4 Package mechanical data

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



DIM.		mm			inch			
DIW.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.		
А	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		
В	0.64		0.9	0.025		0.035		
B2	5.2		5.4	0.204		0.212		
С	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		
Н	9.35		10.1	0.368		0.397		
L2		0.8			0.031			
L4	0.6		1	0.023		0.039		

TO-252 (DPAK) MECHANICAL DATA



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5 Revision History

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



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