

60V N-Channel Enhancement Mode Power MOSFET**General Description**

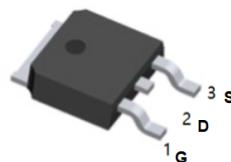
The STD30NF06 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

Features

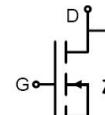
- $V_{DS} = 60V, I_D = 30A$
- $R_{DS(ON)}, 23m\Omega$ (Typ) @ $V_{GS} = 10V$
- $R_{DS(ON)}, 29m\Omega$ (Typ) @ $V_{GS} = 4.5V$
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

Application

- Load Switch
- PWM Application
- Power management



TO-252(DPAK) top view



Schematic Diagram

Absolute Maximum Ratings(TA=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current-Continuous ^{Note3}	TC=25°C	I_D	30	A
	TC=100°C		20	A
Drain Current-Pulsed ^{Note1}		I_{DM}	120	A
Avalanche Energy ^{Note4}		E_{AS}	72	mJ
Maximum Power Dissipation	TC=25°C	P_D	55	W
Storage Temperature Range		T_{STG}	-55 to +150	°C
Operating Junction Temperature Range		T_J	-55 to +150	°C

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max	Unit
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	-	-	2.7	°C/W

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Electrical Characteristics(TJ=25°C unless otherwise noted)

OFF CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_{DS}=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA

ON CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.0	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_{DS}=15A$	-	23	29	$m\Omega$
		$V_{GS}=4.5V, I_{DS}=10A$	-	29	40	$m\Omega$

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V,$ $f=1MHz$	-	1562	-	pF
Output Capacitance	C_{oss}		-	75.4	-	
Reverse Transfer Capacitance	C_{rss}		-	66.8	-	

SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	$V_{GS}=10V, V_{DS}=30V,$ $R_{GEN}=1.8\Omega$ $I_D=15A$	-	7.5	-	ns
Rise Time	t_r		-	21	-	
Turn-Off Delay Time	$T_{d(off)}$		-	16	-	
Fall Time	t_f		-	23.5	-	
Total Gate Charge at 10V	Q_g	$V_{DS}=30V, I_{DS}=15A,$ $V_{GS}=10V$	-	25	-	nC
Gate to Source Gate Charge	Q_{gs}		-	4.5	-	
Gate to Drain "Miller" Charge	Q_{gd}		-	6.5	-	

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{DS}=15A$	-	-	1.2	V
Reverse Recovery Time	t_{rr}	$T_{J}=25^{\circ}C, I_F=15A$	-	29	-	nS
Reverse Recovery Charge	Q_{rr}	$di/dt=100A/\mu s$	-	45	-	nC

Notes:

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, $t \leq 10sec$.
- 3: Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 4: EAS condition: $L=0.5mH, VDD=30V, VG=10V, V_{GATE}=60V, Start\ T_J=25^{\circ}C$.

Typical Performance Characteristics

Figure 1: Output Characteristics

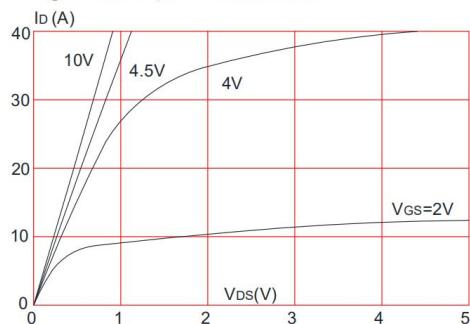


Figure 2: Typical Transfer Characteristics

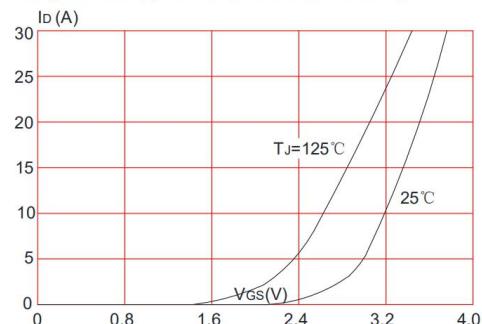


Figure 3: On-resistance vs. Drain Current

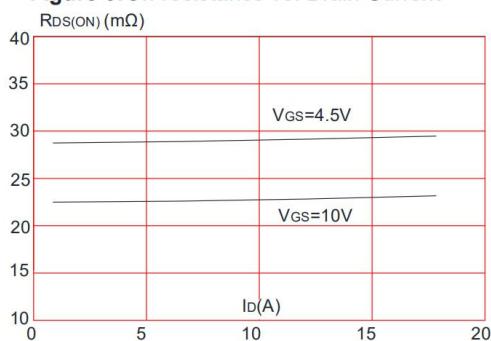


Figure 4: Body Diode Characteristics

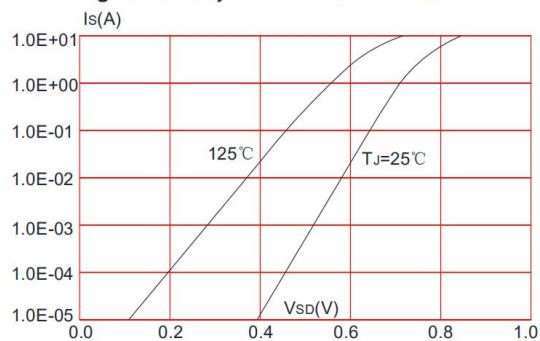


Figure 5: Gate Charge Characteristics

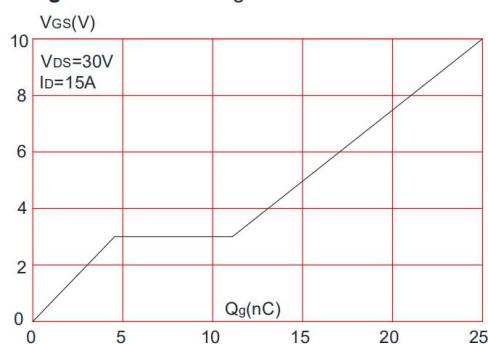
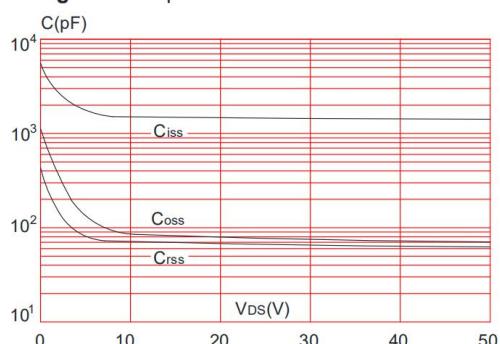
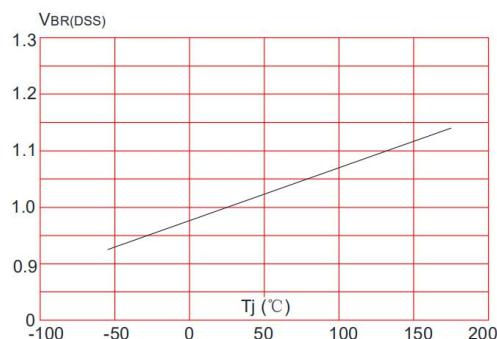
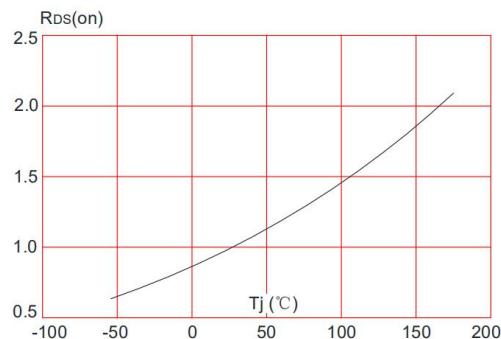
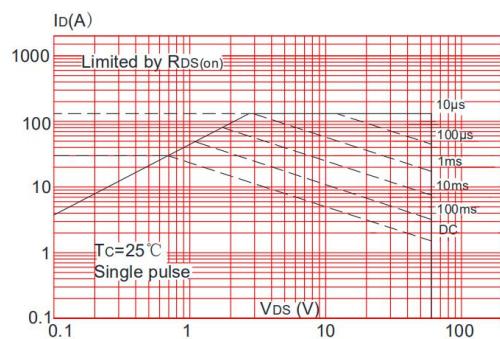
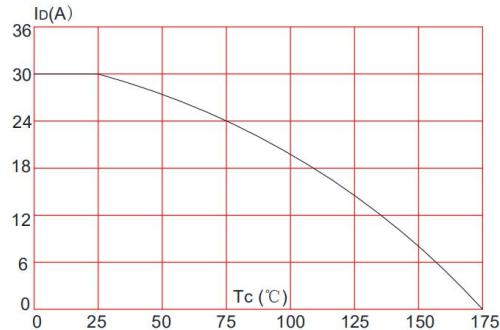
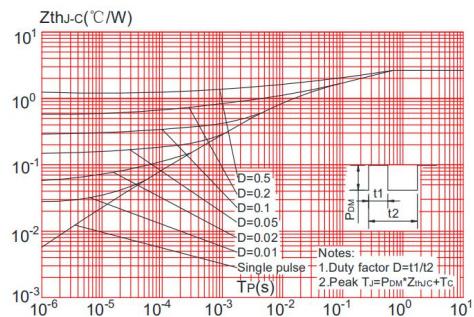


Figure 6: Capacitance Characteristics



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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**Figure 8:** Normalized on Resistance vs. Junction Temperature**Figure 9:** Maximum Safe Operating Area**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature**Figure 11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case

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Test Circuit

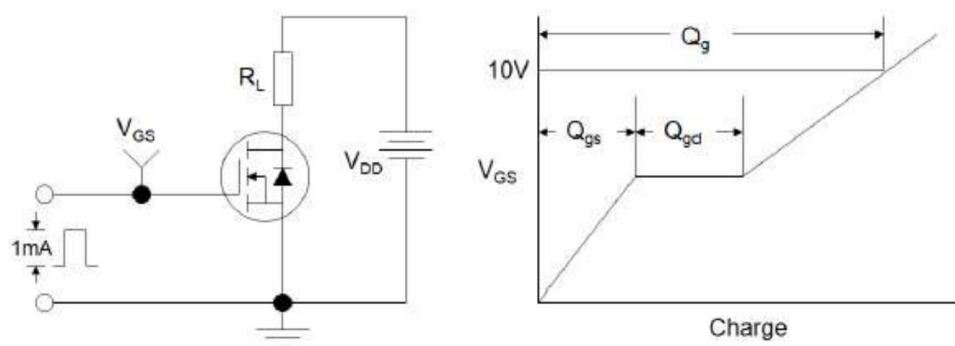


Figure 1: Gate Charge Test Circuit & Waveform

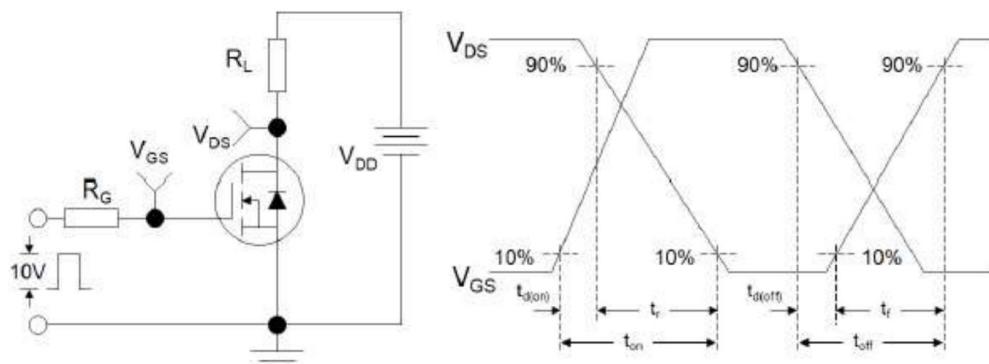


Figure 2: Resistive Switching Test Circuit & Waveforms

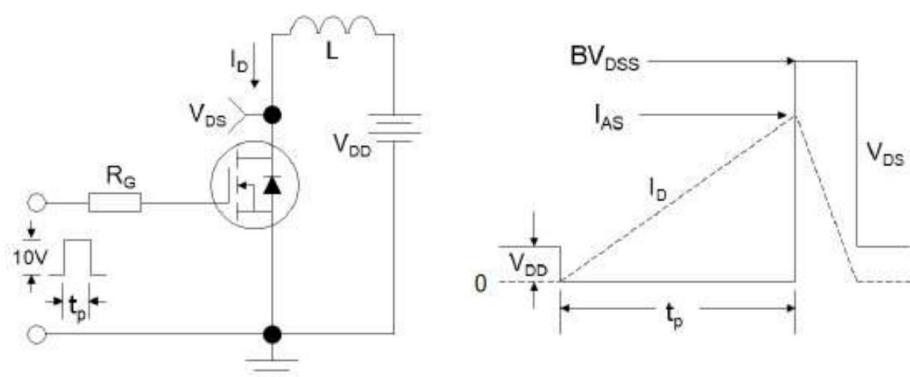
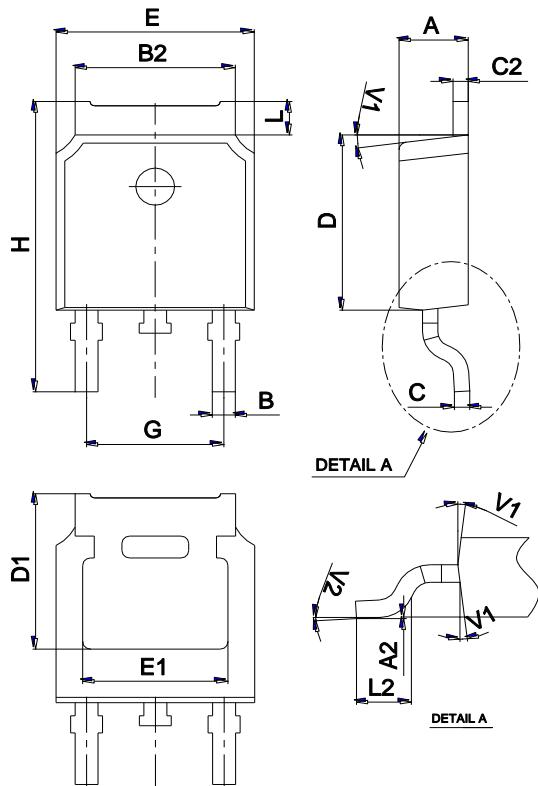


Figure 3: Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Ordering information

Order code	Package	Baseqty	Delivery mode
STD30NF06L	TO-252	2500	Tape and reel