HS50N06

N channel MOSFET

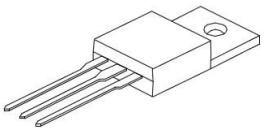
1. Description

The HS50N06 is three-terminal silicon device with current conduction capability of about 50A, fast switching speed. Low on-state resistance, breakdown voltage rating of 60V, and max threshold voltages of 4 volt. It is mainly suitable electronic ballast, and low power switching

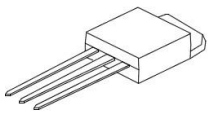
2. Features

- $R_{DS(ON)}$=19mΩ(typical)
- Ultra low gate charge (typical 30nC)
- Low reverse transfer capacitance
- Fast switching capability
- 100％ avalanche energy specified
- Improved dv/dt capability

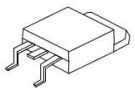
3. Pin configuration



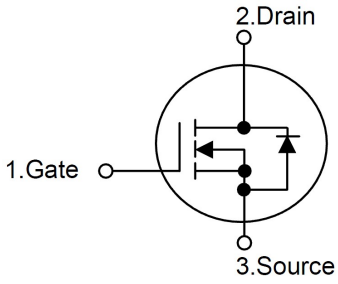
TO-220



TO-251



TO-252



Package	Order Number
TO-220	HS50N06P
TO-251	HS50N06I
TO-252	HS50N06D

4. Absolute maximum ratings

Parameter		Symbol	Value	Unit
Drain to source voltage		V_{DSS}	60	V
Gate to source voltage		V_{GSS}	±20	V
Continuous drain current	T_J=25 ºC	I_D	50	A
	T_J=100 ºC	I_D	35	A
Drain current pulsed (note1)		I_{DM}	200	A
Single pulsed avalanche energy (note2)		E_{AS}	480	mJ
Repetitive avalanche energy (note1)		E_{AR}	13	mJ
Peak diode recovery dv/dt (note3)		dv/dt	7	V/ns
Total power dissipation(T_J=25 ºC)		P_D	130	W
Derating factor above 25 ºC		P_D	0.9	W/ ºC
Operating junction temperature		T_J	-55 ~ +150	ºC
Storage temperature		T_{STG}	-55 ~ +150	ºC

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

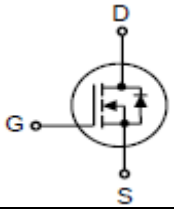
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

5. Thermal resistance

Parameter	Symbol	Typ	Max	Units
Thermal resistance, junction-to-case	θ_{JC}		1.15	ºC/W
Thermal resistance,case-to-sink	θ_{CS}	0.5		ºC/W
Thermal resistance,junction-to-ambient	θ_{JA}		62.5	ºC/W

6. Electrical characteristics

(T_J=25°C,unless otherwise notes)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	60			V
Breakdown voltage temperature coefficient	$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA, referenced to 25 ºC		0.07		V/ºC
Drain-source leakage current	I_{DSS}	V_{DS}=60V,V_{GS}=0V			1	μA
		V_{DS}=48V,T_C=125 ºC			1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=20V,V_{DS}=0V			100	nA
Gate-source leakage Reverse		V_{GS}=-20V,V_{DS}=0V			-100	nA
On characteristics						
Gate threshold voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=10V,I_D=25A		19	22	mΩ
Dynamic characteristics						
Input capacitance	C_{ISS}	V_{DS}=25V,V_{GS}=0V,f=1MHz		1100	1520	pF
Output capacitance	C_{OSS}			430	550	pF
Reverse transfer capacitance	C_{RSS}			80	100	pF
Switching characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DD}=30V,I_D=25A,R_G=50Ω (note4,5)		20	50	ns
Rise time	t_R			100	200	ns
Turn-off delay time	$t_{D(OFF)}$			90	180	ns
Fall time	t_F			80	160	ns
Total gate charge	Q_G	V_{DS}=48V,V_{GS}=10V,I_D=50A (note4,5)		30	40	nC
Gate-source charge	Q_{GS}			9.6		nC
Gate-drain charge (miller charge)	Q_{GD}			10		nC
Source-drain diode ratings and characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0V,I_S=50A			1.5	V
Continuous source current	I_S	Integral reverse p-n junction diode in the MOSFET 			50	A
Pulsed source current	I_{SM}				200	A
Reverse recovery time	t_{RR}	V_{GS}=0V,I_S=50A dI_F/dt=100A/μs(note4)		54		ns
Reverse recovery charge	Q_{RR}			81		μC

Note:1. repetitive rating:pulse width limited by junction temperature
2.L=230uH,I_{AS}=50A,V_{DD}=25V,R_G=25Ω,staring T_J=25ºC
3.I_{SD}≤50A,di/dt≤300A/μs,V_{DD}≤BV_{DSS},staring T_J=25 ºC
4.Pulse test:pulse width≤300μs,duty cycle≤2%
5.Essentially independent of operating temperature

7.Typical Characteristics

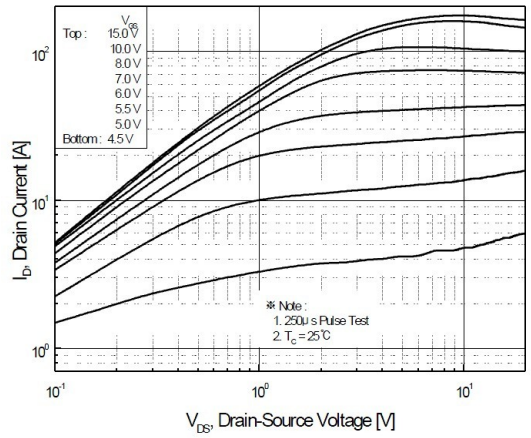


Figure 1. On-Region Characteristics

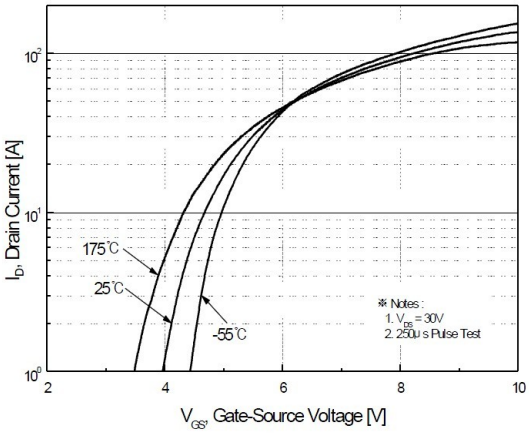


Figure 2. Transfer Characteristics

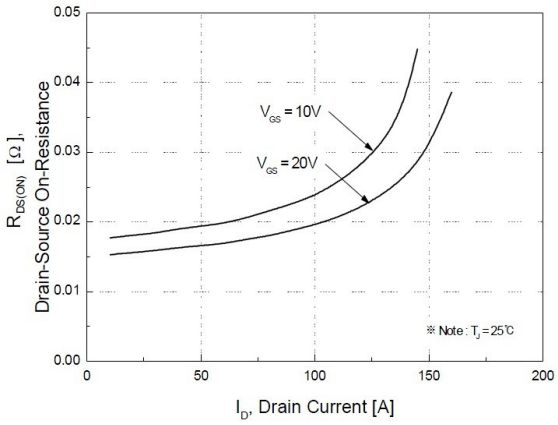


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

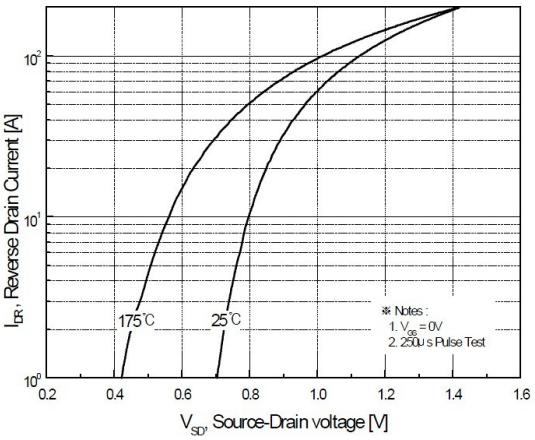


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

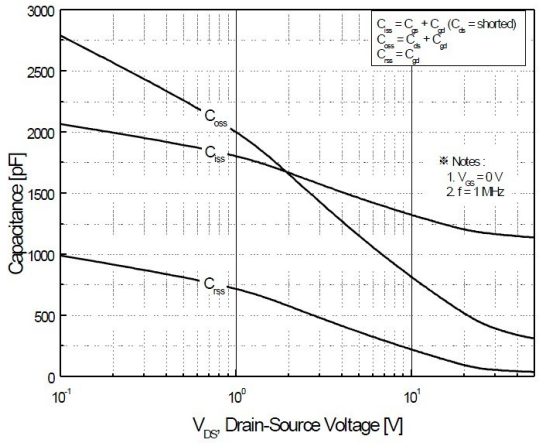


Figure 5. Capacitance Characteristics

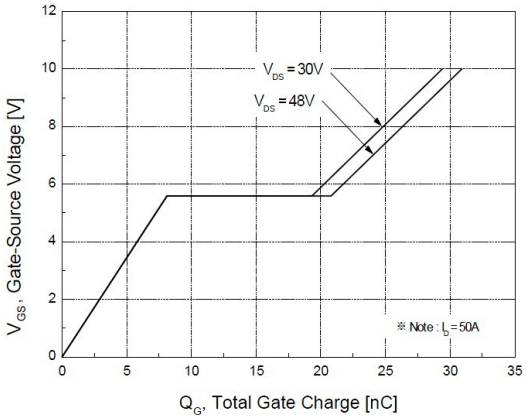


Figure 6. Gate Charge Characteristics

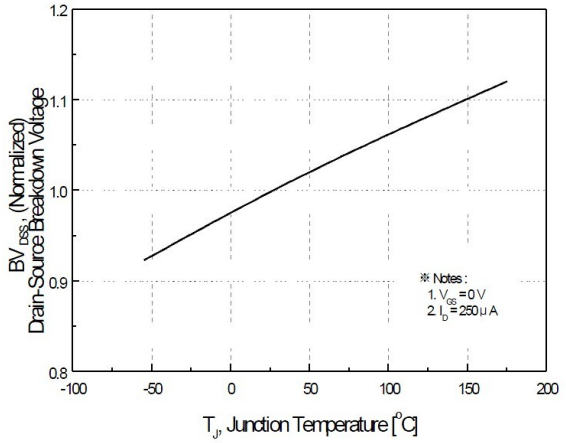


Figure 7. Breakdown Voltage Variation vs. Temperature

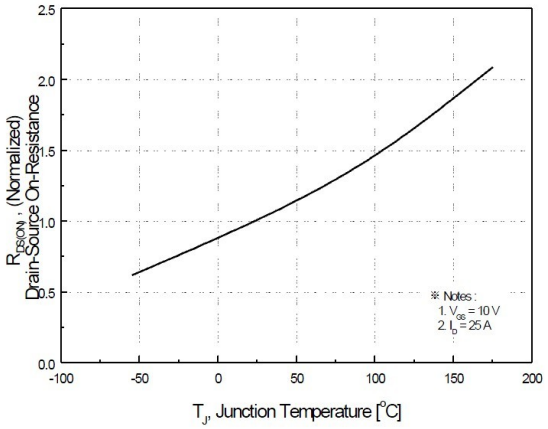


Figure 8. On-Resistance Variation vs. Temperature

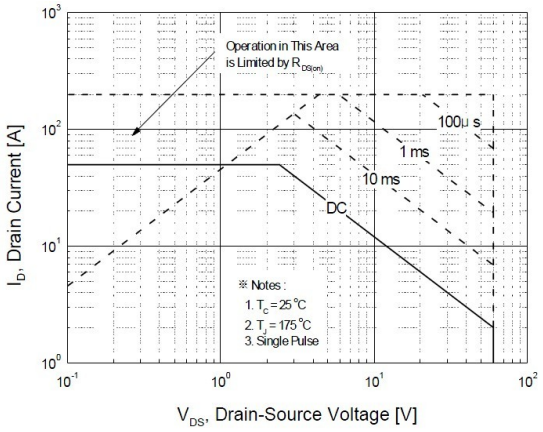


Figure 9. Maximum Safe Operating Area

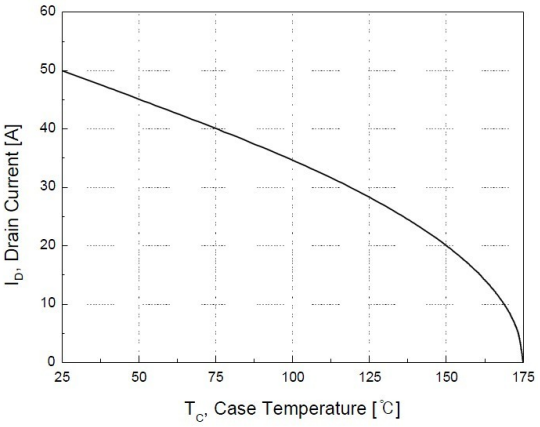


Figure 10. Maximum Drain Current vs. Case Temperature

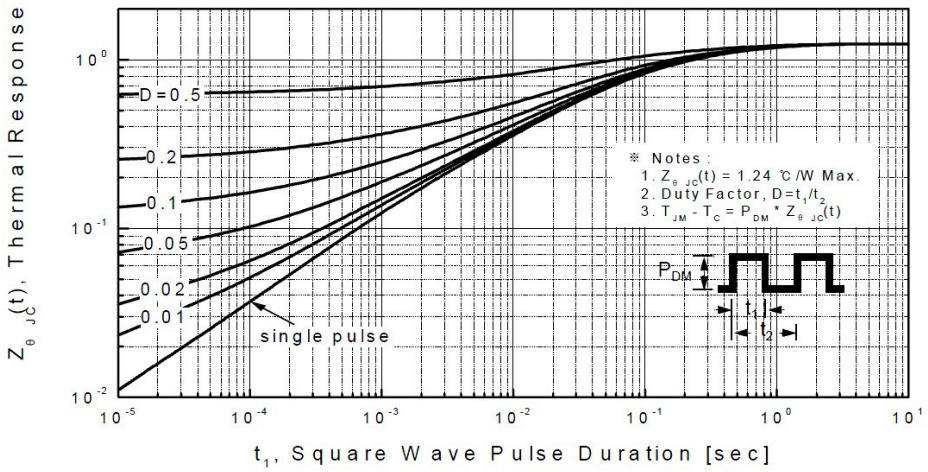


Figure 11. Transient Thermal Response Curve

