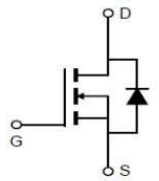
500V Power MOSFET

● General Description

The Power MOSFET LH13N50 with a low resistance package to provide extremely low RDS(ON).This device is ideal for switch power and adapter.



VDS =500V

$R_{DS(ON)}$=0.4Ω

ID =13A

■ RoHS COMPLIANT

TO-220F

TO-220

● Features

■Low thermal resistance

■Fast switching

■High input resistance

■RoHS compliant

●Application

■Electronic ballast

■Electronic transformer

■Switch mode power supply

●Ordering Information:

Part number	LH13N50	LH13N50
Package	TO-220F	TO-220
Basic ordering unit (pcs)	1000	1000
Normal Package Material Ordering Code	LH13N50F-TO220F-TU	LH13N50T-TO220-TU
Halogen Free Ordering Code	LH13N50F-TO220F-TU-HF	LH13N50T-TO220-TU-HF

●Absolute Maximum Ratings (Tc =25℃)

Parameter	**Symbol**	Rating	Unit
Drain-Source Voltage	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current T_C = 25°C	I_D	13	A
Continuous Drain Current TC = 100°C	I_D	8	A
Pulsed drain current [1]	I_{DM}	52	A
Single Pulse Avalanche Energy[2]	E_{AS}	676	mJ
Total Power Dissipation(TC=25℃)	Ptot	TO-220:170	W
		TO-220F:56	
Operating Junction Temperature	Tj	150	℃
Storage Temperature	T_{stg}	-55-150	℃

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	500			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta Tj$	I_D=250uA, Referenced to 25°C		0.78		V/°C
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=250μA	2.0		4.0	V
Drain-Source Leakage Current	I_{DSS}	V_{DS} =500V, V_{GS} =0V, Tj=25°C			1	uA
		V_{DS} =400V, V_{GS} =0V, Tj=125°C			100	
Gate- Source Leakage Current	I_{GSS}	V_{GS} =±30V			±100	uA
Static Drain-source On	$R_{DS(ON)}$	V_{GS} =10V, I_D=6.5A		0.4	0.55	Ω
Transconductance[3]	gfs	V_{DS} =15V, I_D=4.5A		14.5		S

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	Ciss	V_{GS} = 0V, V_{DS} = 25V F = 1.0MHZ		1065		pF
Output capacitance	Coss			136		
Reverse transfer capacitance	Crss			21		
Turn -Off Delay Time	Td(off)	V_{DD}=250V, I_D =13A R_G=25Ω③		144		ns
Turn-on delay time	Td(on)			28		
Rise time	Tr			22		
Fall time	Tf			32		
Total Gate Charge	Qg	I_D =13A, V_{DS} = 400V V_{GS} = 10V		36.7		nC
Gate-to-Source Charge	Qgs			7.7		
Gate-to-Drain Charge	Qgd			12.3		
Diode Forward Voltage[3]	V_{SD}	Tj=25°C, Is=9.0A V_{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	Trr	Tj=25°C,If=13A di/dt=100A/μs		420		ns
Body Diode Reverse Recovery Charge	Q_{rr}			4.2		nC
Continuous Source Current (body diode)	I_S				13	A

•Thermal resistance

Parameter	Symbol	Max.		Unit
		TO-220F	TO-220	
Thermal resistance, junction - case	R_{thJC}	2.23	0.74	°C/W
Thermal resistance, junction - ambient	R_{thJA}	62.5	62.5	°C/W

Notes:

1. Repetitive rating: Pulse width limited by maximum junction temperature
2. Starting Tj=25°C, VDD =50V, L=14mH, RG =25Ω, IAS=9.0A
3. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

Typical Characteristics

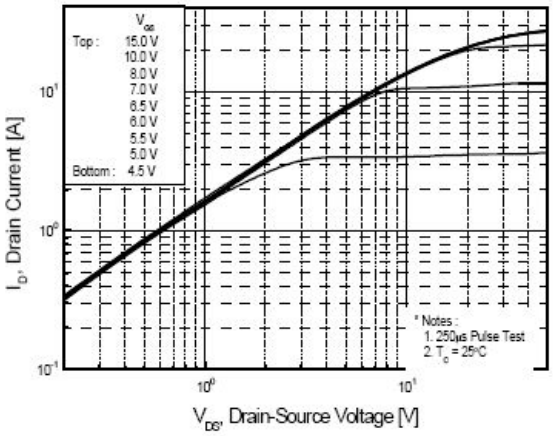


Fig1 Typical Output Characteristics, Tc=25℃

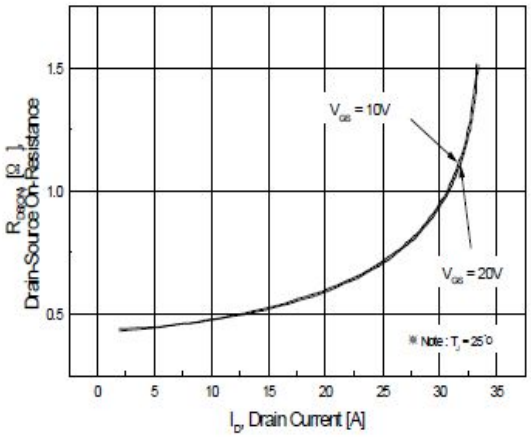


Fig2 On-Resistance Vs.Drain Current and Gate Voltage

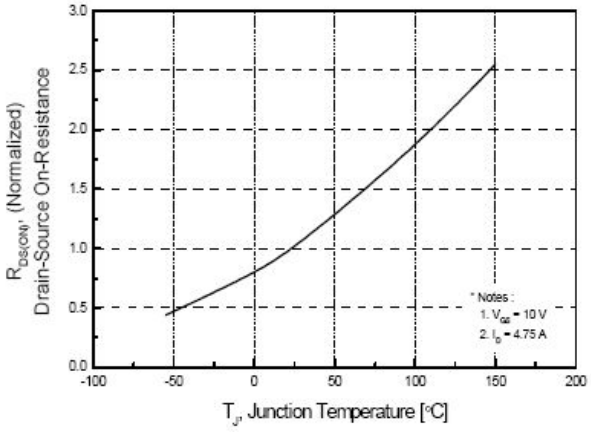


Fig3 Normalized On-Resistance Vs.Temperature

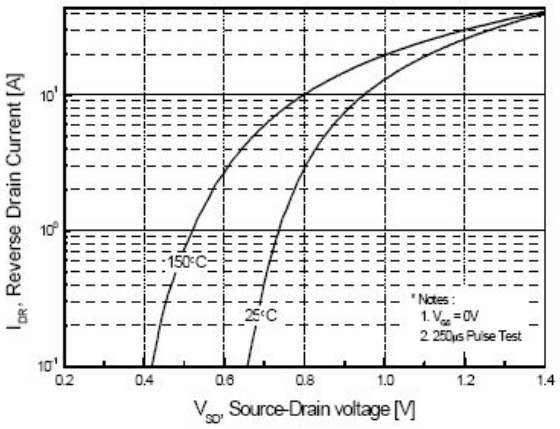


Fig4 Typical Source-Drain Diode Forward Voltage

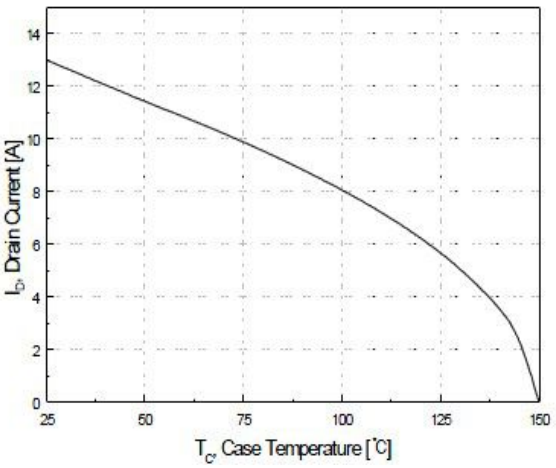
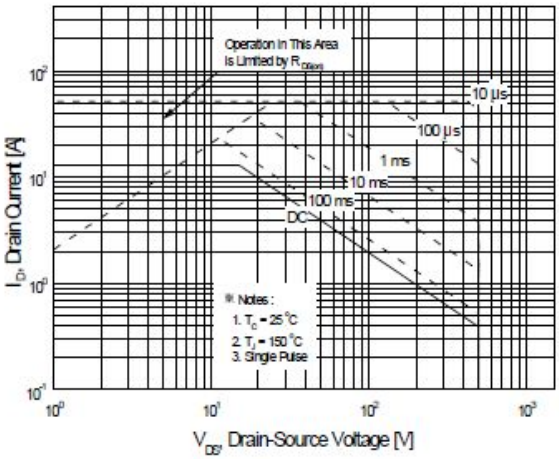


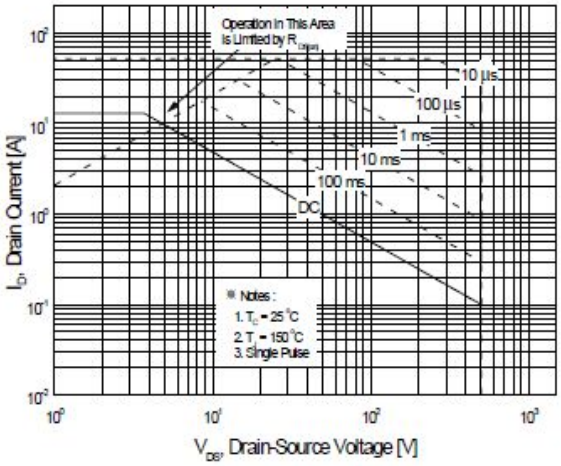
Fig5 Maximum Drain Current Vs.Case Temperature

Typical Characteristics(cont.)



TO-220

Fig6-1 Maximum Safe Operating Area



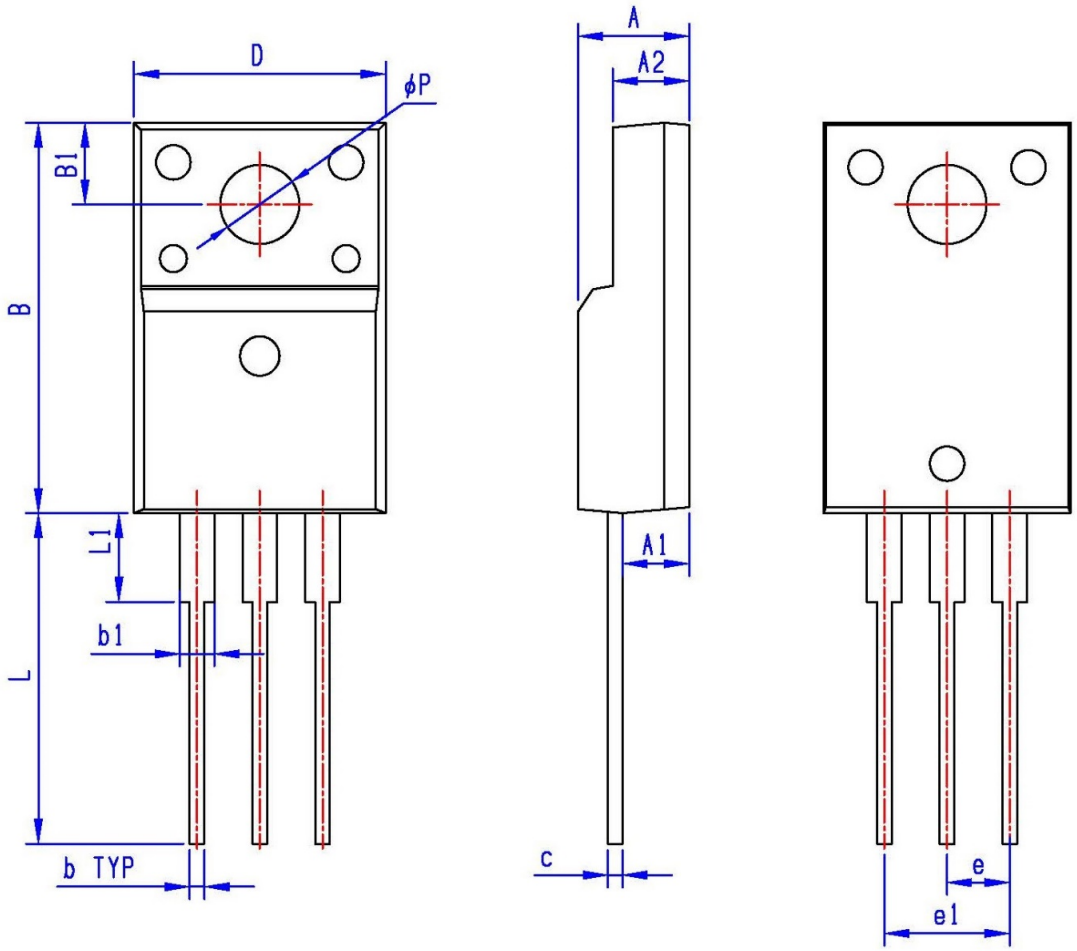
TO-220F

Fig6-2 Maximum Safe Operating Area

●Dimensions（TO-220F）

Unit：mm

SYMBOL	min	max	SYMBOL	min	max
A	4.40	4.90	B1	2.90	3.70
A1	2.40	3.00	e	2.40	2.70
A2	2.30	3.00	e1	4.95	5.25
b	0.60	0.90	L	12.40	14.20
b1	1.10	1.70	L1	2.40	3.40
c	0.40	0.70	⌀P	2.90	3.50
D	9.80	10.60			
B	15.40	16.40			



- **Dimensions（TO-220）**

Unit：mm

SYMBOL	min	max	SYMBOL	min	max
A	4.25	4.85	B1	2.60	3.00
A1	2.30	3.00	e	2.40	2.70
A2	1.20	1.40	e1	4.95	5.25
b	0.60	0.90	L	12.40	14.20
b1	1.10	1.70	L1	2.40	3.40
c	0.40	0.70	⌀P	3.50	3.90
D	9.80	10.60			
B	15.20	16.20