

Description

The SX13P20D is silicon P-channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency.

General Features

$V_{DS} = -200V$ $I_D = 13A$

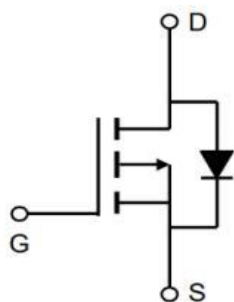
$R_{DS(ON)} < 420m\Omega$ @ $V_{GS}=10V$

Application

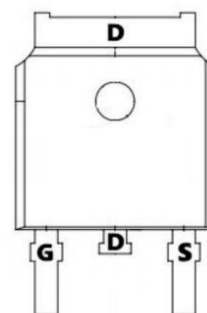
Load Switch

PWM Application

Power management



TO-252-3L



Absolute Maximum Ratings ($T_c=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	-200	V
VGS	Gate-Source Voltage	± 20	V
ID@TA=25°C	Continuous Drain Current	-13	A
ID@TA=100°C	Continuous Drain Current	-7.2	A
IDM	Pulsed Drain Current ^a	-52	A
EAS	Single Pulse Avalanche Energy ^b	750	mJ
IAR	Repetitive Avalanche Current ^a	-11	A
P _D	Maximum Power Dissipation	125	W
T _J , T _{stg}	Operating Junction and Storage Temperature Range	-55 to +150	°C
R _{thJA}	Maximum Junction-to-Ambient	62	°C/W
R _{thJC}	Maximum Junction-to-Case (Drain)	1.0	°C/W

Electrical Characteristics (T_J=25°C, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{DS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	-200	-230	-	V
V _{GS(th)}	Gate-Source Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-2.0	-3.5	-4.0	V
I _{GSS}	Gate-Source Leakage	V _{GS} = ± 20 V	-	-	±100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-200V, V _{GS} =0V	-	-	-100	μA
I _{DSS}		V _{DS} =-160V, V _{GS} =0V, T _J =125°C	-	-	-500	
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-10 V I _D =-5.5A	-	340	420	mΩ
g _{fs}	Forward Transconductance	V _{DS} =-50 V, I _D =-6.6A	4.1	-	-	S
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-25 V, f=1.0MHz,	-	1200	-	pF
C _{oss}	Output Capacitance		-	370	-	
C _{rss}	Reverse Transfer Capacitance		-	81	-	
Q _g	Total Gate Charge	V _{GS} =-10V I _D =-11A, V _{DS} =-160V,	-	-	44	nC
Q _{gs}	Gate-Source Charge		-	-	7.1	
Q _{gd}	Gate-Drain Charge		-	-	27	
t _{d(on)}	Turn-On Delay Time	V _{DD} =-100V, I _D =-11A R _g =9.1Ω	-	14	-	ns
t _r	Rise Time		-	43	-	
t _{d(off)}	Turn-Off Delay Time		-	39	-	
t _f	Fall Time		-	38	-	
R _g	Gate Input Resistance	f=1MHz, open drain	0.3	-	1.7	Ω
V _{SD}	Body Diode Voltage	T _J =25 °C, I _S =-11A, V _{GS} =0V	-	-	-5	V
t _{rr}	Body Diode Reverse Recovery Time	T _J =25°C, I _F =-11A, dI/dt=100A/μs	-	250	300	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	2.9	3.6	μC
I _S	Continuous Source-Drain Diode Current Pulsed Diode Forward Current ^a		-	-	-11	A
I _{SM}			-	-	-44	
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _s and L _D)				

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、The EAS data shows Max. rating . The test condition is T_J = 25°C, L=0.3mH, R_G=25Ω, V_{DD}=50V , V_{GS}=10V
- 4、The I_{SD}=40A, di/dt≤100A/us, V_{DD}≤BV_{DS}, Start T_J=25°C
- 5、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

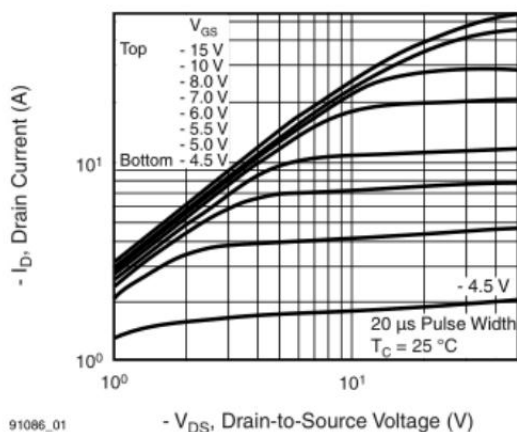


Fig. 1 - Typical Output Characteristics, $T_C = 25^\circ\text{C}$

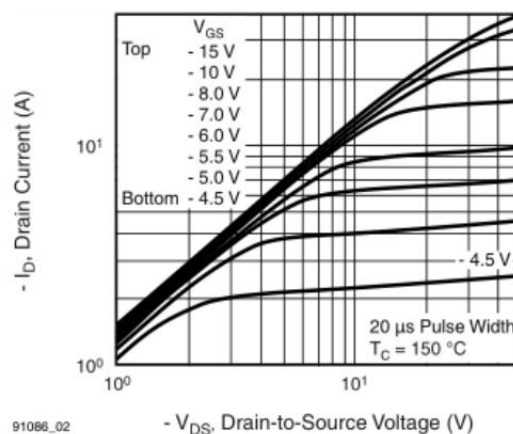


Fig. 2 - Typical Output Characteristics, $T_C = 150^\circ\text{C}$

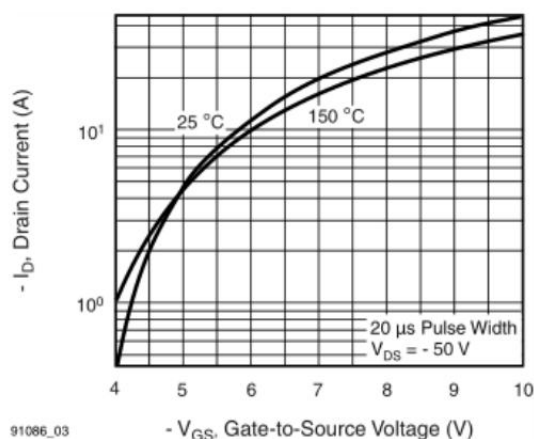


Fig. 3 - Typical Transfer Characteristics

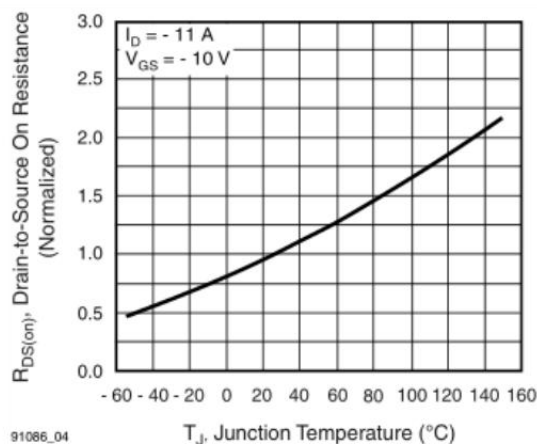


Fig. 4 - Normalized On-Resistance vs. Temperature

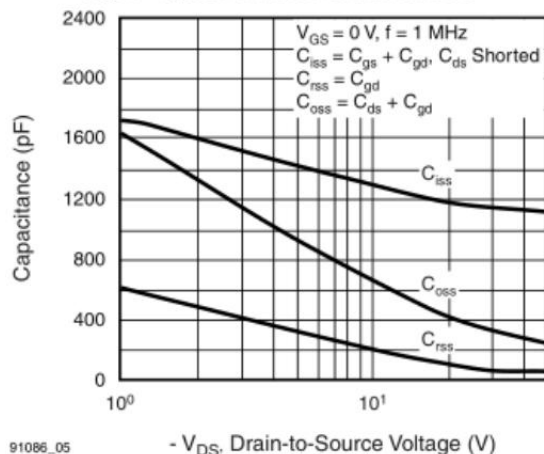


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

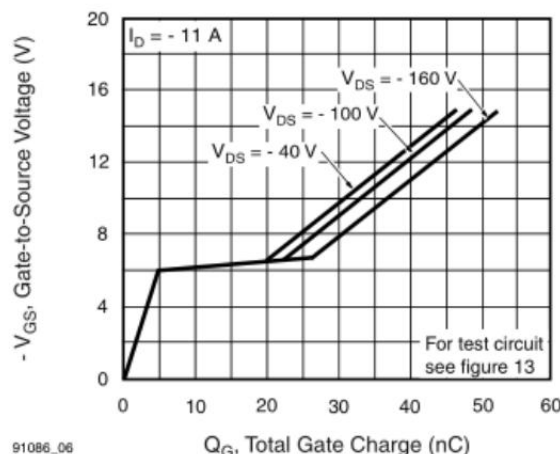


Fig. 6 - Typical Gate Charge vs. Drain-to-Source Voltage

Typical Characteristics

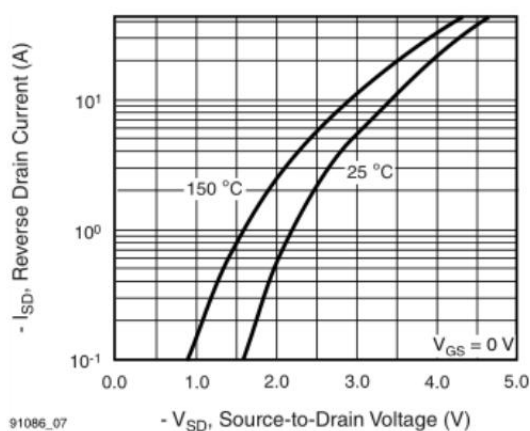


Fig. 7 - Typical Source-Drain Diode Forward Voltage

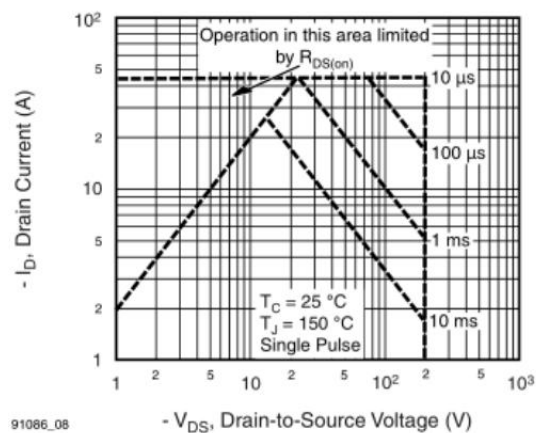


Fig. 8 - Maximum Safe Operating Area

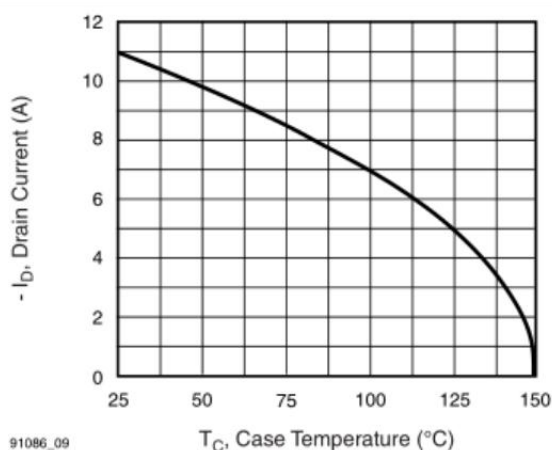


Fig. 9 - Maximum Drain Current vs. Case Temperature

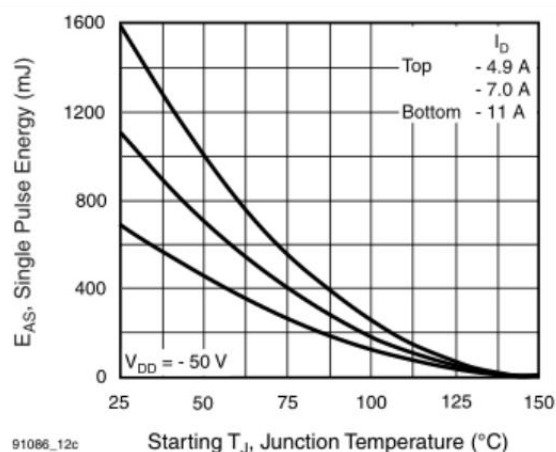


Fig. 10 - Maximum Avalanche Energy vs. Drain Current

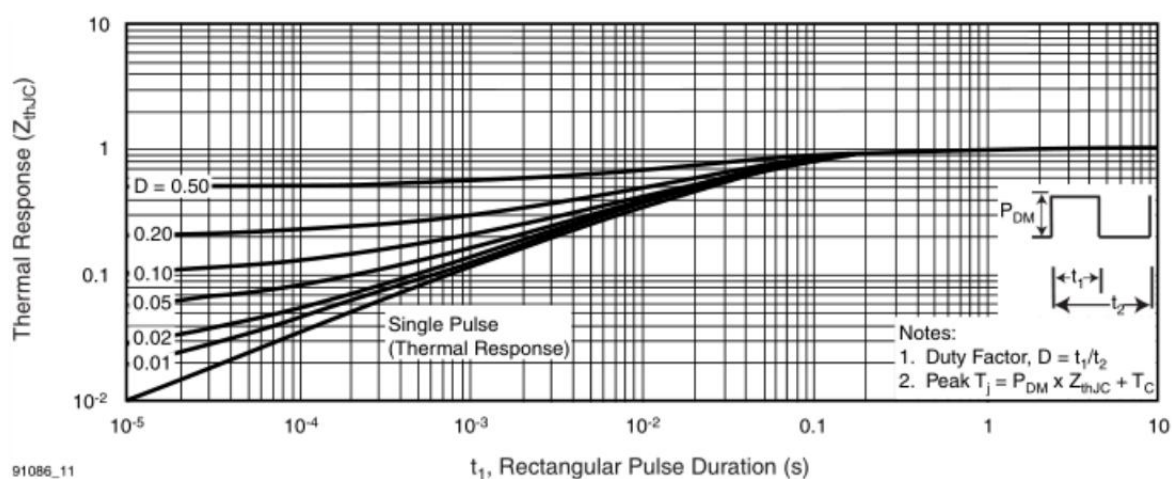
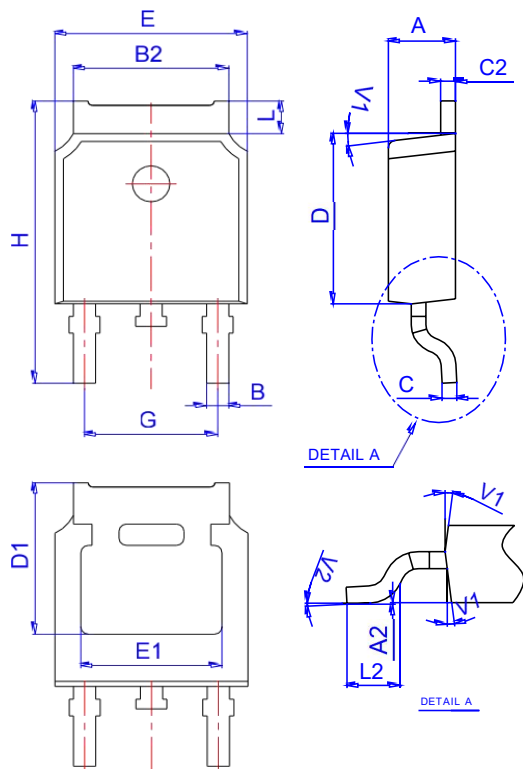


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Mechanical Data: TO-252-3L



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°

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	TO-252-3L		2500