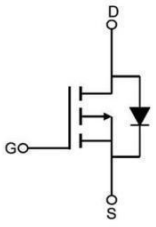
APP13P20K

P-Channel Enhancement Mosfet

DATA SHEET

Features

- -200V,-13A
  $R_{DS(ON)}$ <0.42Ω @V_{GS}=-10V TYP:0.34Ω
- Self-aligned Planar Technology
- Excellent Switching Performance



Schematic Diagram

Applications

- Power amplifier
- Motor drive



Marking and pin assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
P13P20K	APP13P20K	TO-252	-	-	2500

ABSOLUTE MAXIMUM RATINGS (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-200	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current (Tc=25℃)(1)	I_D	-13	A
Continuous Drain Current (Tc=100℃)(1)	I_D	-7.2	A
Pulsed Drain Current (2,3)	I_{DM}	-52	A
Drain Power Dissipation(1)	P_D	125	W
Single Pulsed Avalanche Energy	E_{AS}	750	mJ
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.0	℃/W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62	℃/W
Junction Temperature	T_J	-55~ +150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

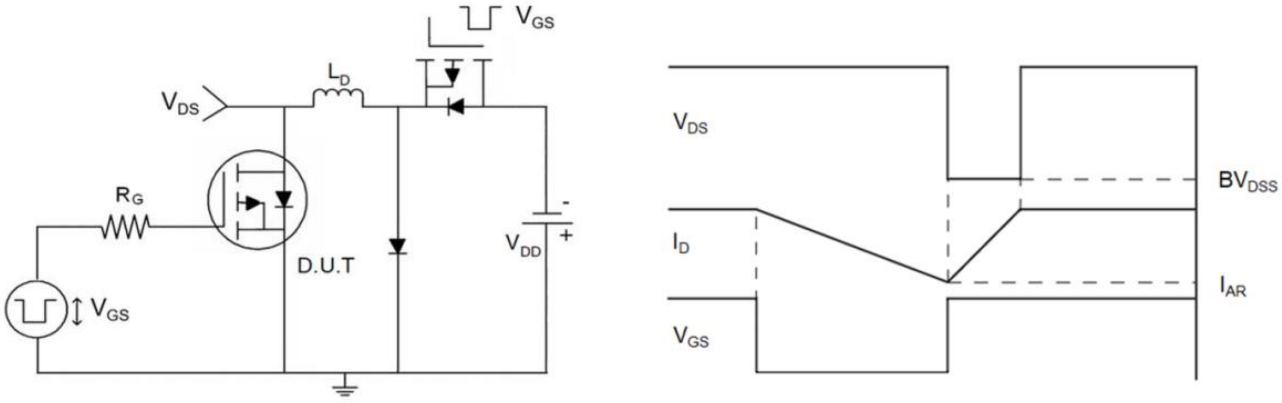
MOSFET ELECTRICAL CHARACTERISTICS(T_j=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	-200	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-200V, V_{GS} = 0V	-	-	-100	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage(4)	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-2.0	-	-4.0	V
Drain-source on-resistance(4)	$R_{DS(on)}$	V_{GS} =-10V, I_D =-5.5A	-	0.34	0.42	Ω
Gate Input Resistance	R_G	f=1MHz	0.3	-	1.7	Ω
Dynamic characteristics(5)						
Input Capacitance	C_{iss}	V_{DS} =-25V, VGS=0V, f=1MHz	-	1200	-	pF
Output Capacitance	C_{oss}		-	370	-	
Reverse Transfer Capacitance	C_{rss}		-	81	-	
Switching characteristics(5)						
Turn-on delay time	$t_{d(on)}$	V_{DD}=-100V, I_D=-11A, R_G=9.1Ω, V_{GS}=-10V	-	14	-	nS
Turn-on rise time	t_r		-	43	-	
Turn-off delay time	$t_{d(off)}$		-	39	-	
Turn-off fall time	t_f		-	38	-	
Total Gate Charge	Qg	V_{DS}=-160V, I_D=-11A, V_{GS}=-10V	-	44	-	nC
Gate-Source Charge	Qgs		-	7.1	-	
Gate-Drain Charge	Qgd		-	27	-	
Source-Drain Diode characteristics						
Diode Forward voltage(4)	V_{SD}	T_J=25℃, V_{GS} =0V, I_S=-11A	-	-	-5	V
Diode Forward current	I_S	T_C=25℃	-	-	-13	A
Body Diode Reverse Recovery Time	trr	T_J=25℃, I_F=-11A,di/dt=100A/us	-	250	300	nS
Body Diode Reverse Recovery Charge	Qrr		-	2.9	3.6	nC

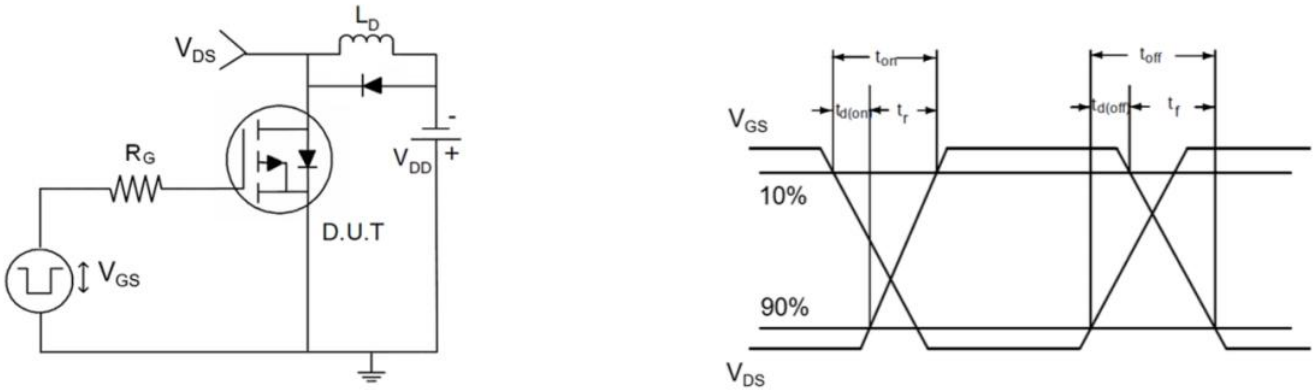
Notes:

1) Surface Mounted on 1 in² pad area, t ≤ 10 sec
2) Pulse width ≤ 10μs, duty cycle ≤ 1 %
3) Limited by bonding wire
4) Pulse width ≤ 300 μs, duty cycle ≤ 2%
5) Guaranteed by design, not subject to production testing

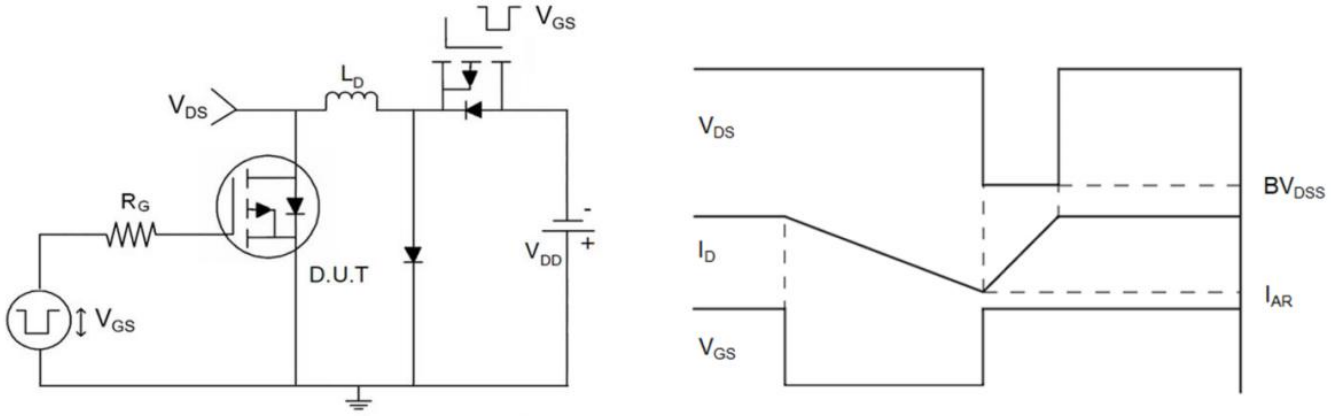
Test Circuit & Waveform



Gate Charge Test Circuit



Resistive Switching Test Circuit



Unclamped Inductive Switching Test Circuit

Typical Characteristics

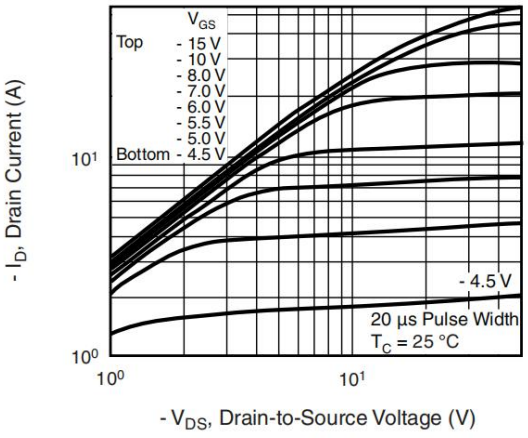


Fig. 1 - Typical Output Characteristics, T_C = 25 °C

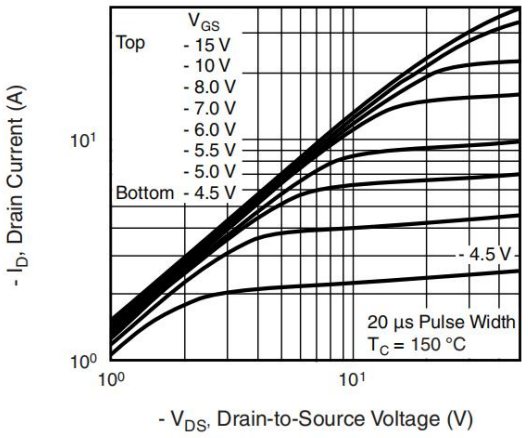


Fig. 2 - Typical Output Characteristics, T_C = 150 °C

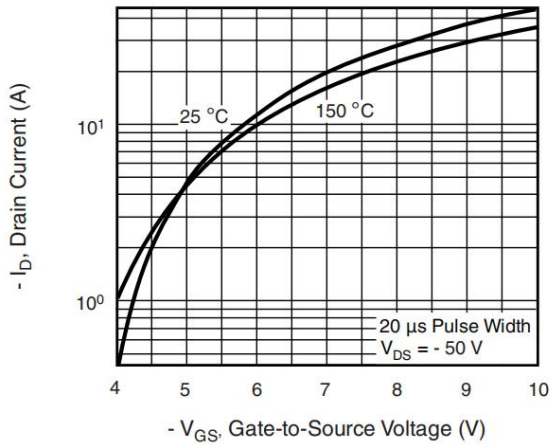


Fig. 3 - Typical Transfer Characteristics

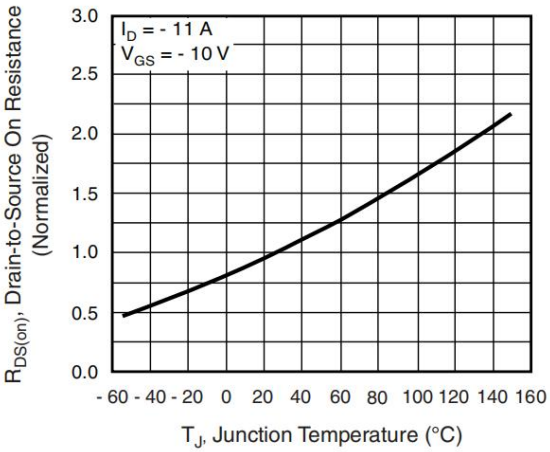


Fig. 4 - Normalized On-Resistance vs. Temperature

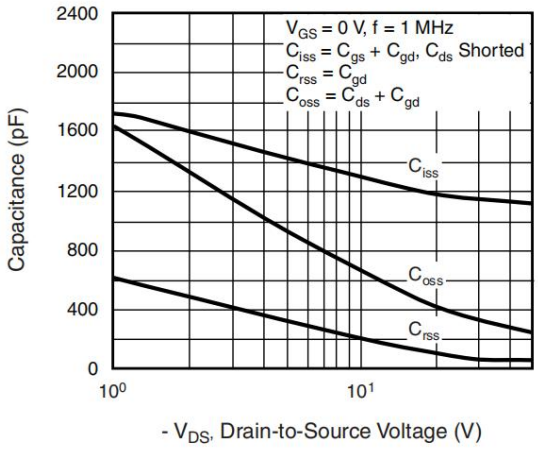


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

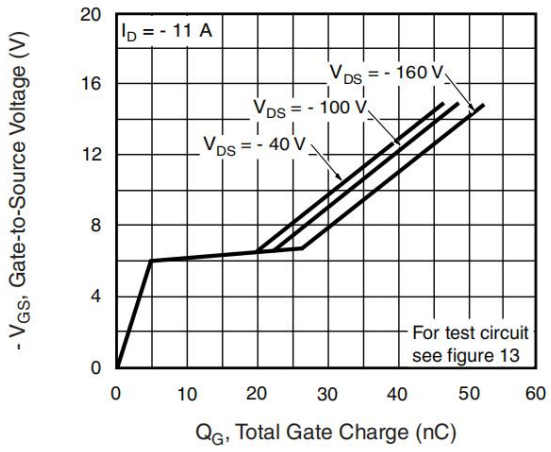


Fig. 6 - Typical Gate Charge vs. Drain-to-Source Voltage

Typical Characteristics (cont.)

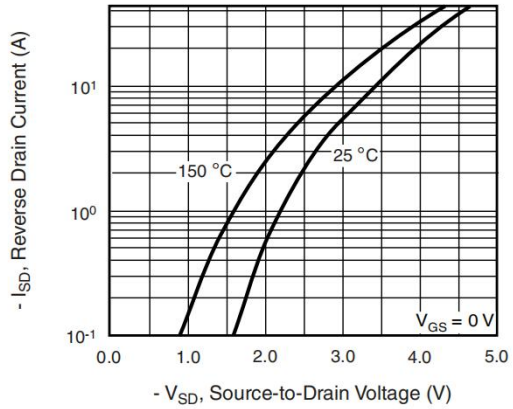


Fig. 7 - Typical Source-Drain Diode Forward Voltage

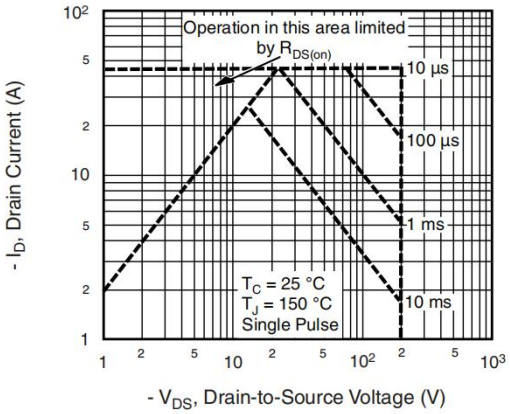


Fig. 8 - Maximum Safe Operating Area

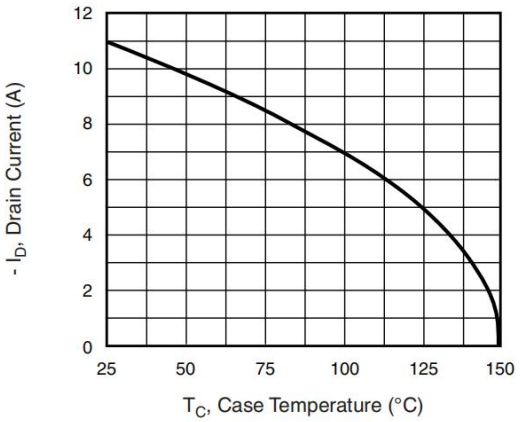


Fig. 9 - Maximum Drain Current vs. Case Temperature

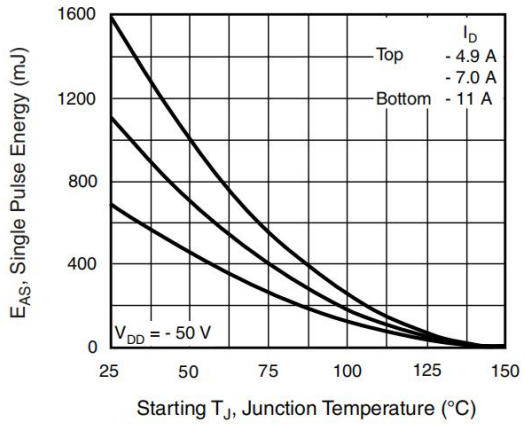


Fig. 10 - Maximum Avalanche Energy vs. Drain Current

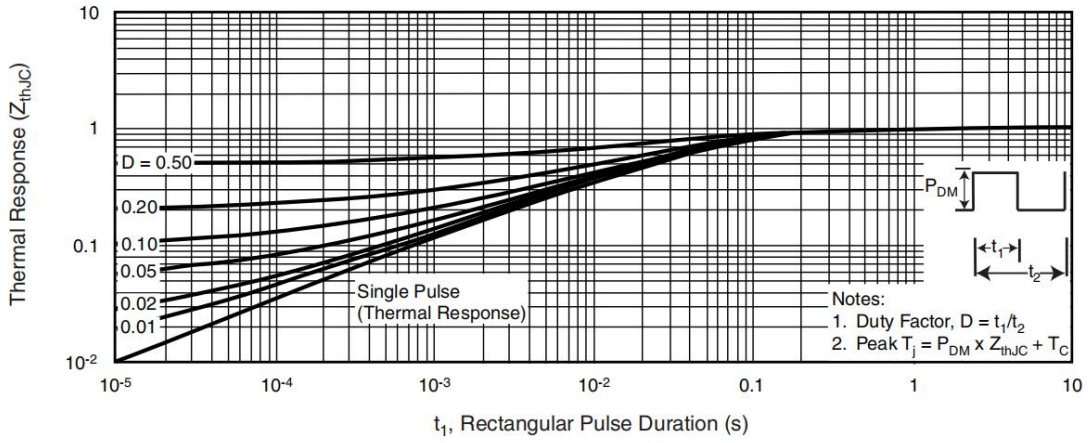
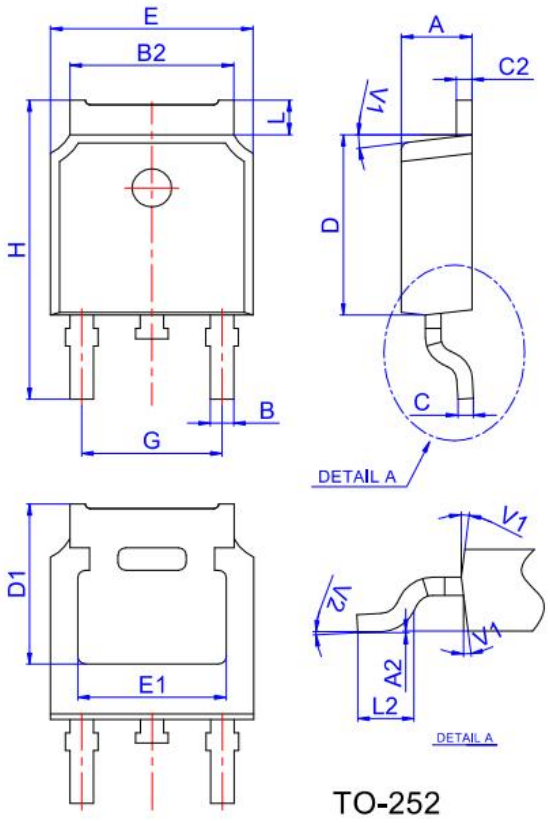


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

TO-252 Package Information



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°

Revision History

Revision	Release	Remark
V1.0	2023/11/01	Initial Release

Disclaimer

The information given in this document describes the independent performance of the product,but similar performance is not guaranteed under other working conditions,and cannot be guaranteed when installed with other products or equipment.To achieve the required performance of the product in actual scenarios,the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings,operating conditions,or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which
requires high reliability.Customers using or selling these products for use in medical,life-saving,or life-sustaining applications do so at their own risk and agree to fully indemnify.

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