

BV _{DSS}	-40V
R _{DS(ON)}	45mΩ
I _D	-12A

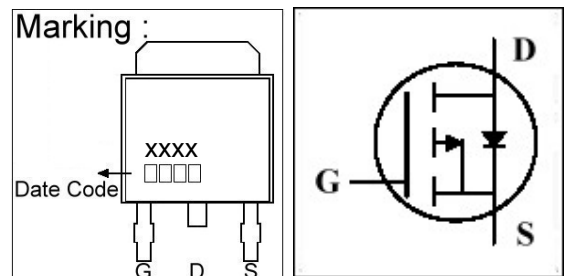
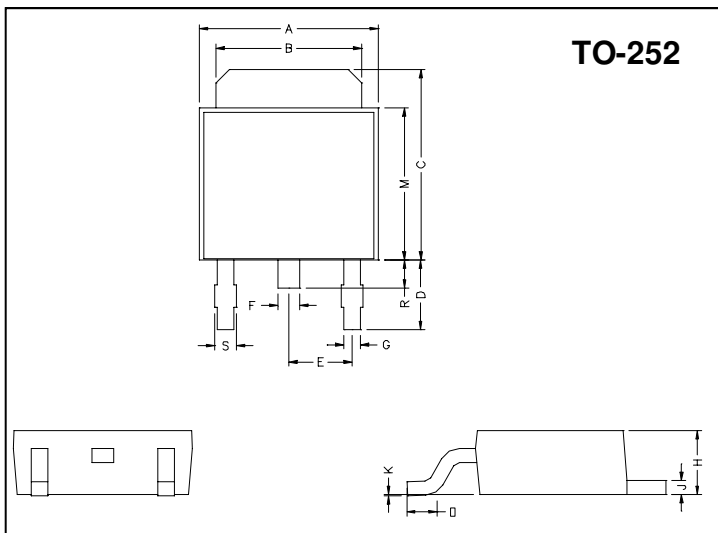
P-CHANNEL ENHANCEMENT MODE POWER MOSFET
Description

The BP413 uses advanced trench technology to provide excellent on-resistance, low gate charge and low gate resistance.

The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for high current load applications.

Features

- *Simple Drive Requirement
- *Lower On-resistance
- *Fast Switching Characteristic

Package Dimensions


REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	6.40	6.80	G	0.50	0.70
B	5.20	5.50	H	2.20	2.40
C	6.80	7.20	J	0.45	0.55
D	2.40	3.00	K	0	0.15
E	2.30 REF.		L	0.90	1.50
F	0.70	0.90	M	5.40	5.80
S	0.60	0.90	R	0.80	1.20

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V _{DS}	-40	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current, V _{GS} @10V	I _D @T _C =25°C	-12	A
Continuous Drain Current, V _{GS} @10V	I _D @T _C =100°C	-14	A
Pulsed Drain Current ¹	I _{DM}	-40	A
Total Power Dissipation	P _D @T _C =25°C	60	W
Linear Derating Factor		0.4	W/°C
Single Pulse Avalanche Energy ²	E _{AS}	61	mJ
Single Pulse Avalanche Current	I _{AS}	-35	A
Operating Junction and Storage Temperature Range	T _j , T _{stg}	-55 ~ +175	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-case Max.	R _{thj-c}	2.5	°C/W
Thermal Resistance Junction-ambient Max.	R _{thj-a}	50	°C/W

Electrical Characteristics (T_j = 25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	BV _{DSS}	-40	-	-	V	V _{GS} =0, I _D =-250uA
Gate Threshold Voltage	V _{GS(th)}	-1.2	-	-2.4	V	V _{DS} =V _{GS} , I _D =-250uA
Forward Transconductance	g _{fs}	-	17	-	S	V _{DS} =-5V, I _D =-18A
Gate-Source Leakage Current	I _{GSS}	-	-	±100	nA	V _{GS} = ±20V
Drain-Source Leakage Current(T _j =25°C)	I _{DSS}	-	-	-1	uA	V _{DS} =-30V, V _{GS} =0
Drain-Source Leakage Current(T _j =55°C)		-	-	-5	uA	V _{DS} =-24V, V _{GS} =0
Static Drain-Source On-Resistance ³	R _{DS(ON)}	-	-	45	m	V _{GS} =-10V, I _D =-18A
		-	-	69		V _{GS} =-4.5V, I _D =-10A
Total Gate Charge ³	Q _g	-	18.7	23	nC	I _D =-18A V _{DS} =-15V V _{GS} =-10V
Gate-Source Charge	Q _{gs}	-	2.54	-		
Gate-Drain ("Miller") Change	Q _{gd}	-	5.4	-		
Turn-on Delay Time ³	T _{d(on)}	-	9	13	ns	V _{DS} =-15V V _{GS} =-10V R _G =3 R _L =0.82
Rise Time	T _r	-	25	-		
Turn-off Delay Time	T _{d(off)}	-	20	-		
Fall Time	T _f	-	12	-		
Input Capacitance	C _{iss}	-	920	1100	pF	V _{GS} =0V V _{DS} =-15V f=1.0MHz
Output Capacitance	C _{oss}	-	190	-		
Reverse Transfer Capacitance	C _{rss}	-	122	-		

Source-Drain Diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage ³	V _{SD}	-	-	-1.0	V	I _S =-1A, V _{GS} =0V
Continuous Source Current (Body Diode)	I _S	-	-	-18	A	V _D = V _G =0V, V _S =-1.0V
Reverse Recovery Time ³	T _{rr}	-	21.4	-	ns	I _S =-18A, V _{GS} =0V di/dt=100A/μs
Reverse Recovery Charge	Q _{rr}	-	13	-	nC	

Notes: 1. Pulse width limited by safe operating area.

2. Staring T_j=25°C, V_{DD}=25V, L=0.1mH, R_G=25 .

3. Pulse width ≤ 300us, duty cycle ≤ 2%.

Characteristics Curve

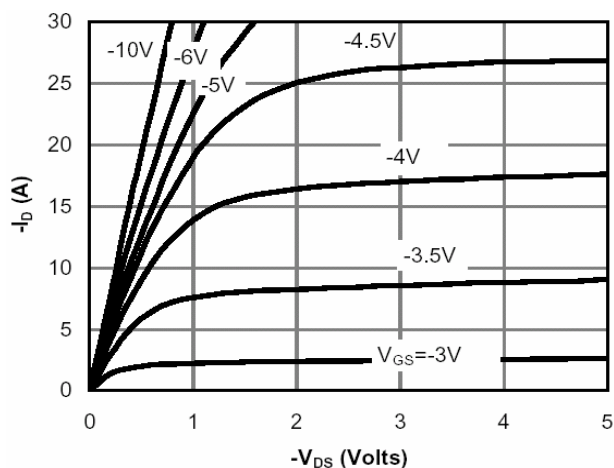


Fig 1. Typical Output Characteristics

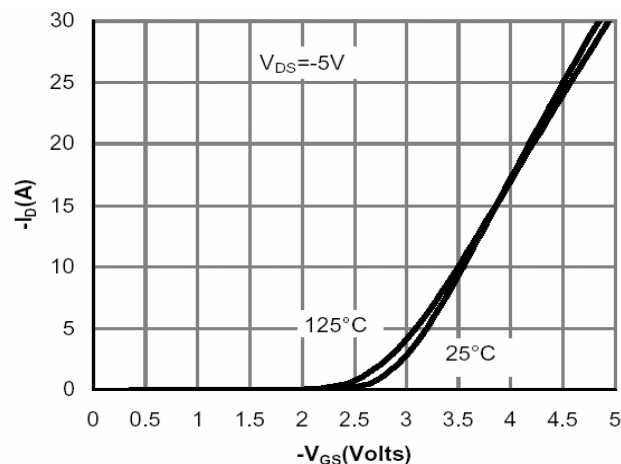


Fig 2. Transfer Characteristics

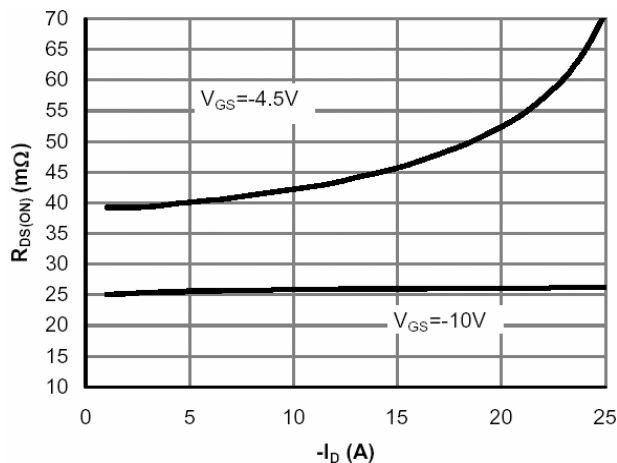


Fig 3. On-Resistance v.s. Drain Current and Gate Voltage

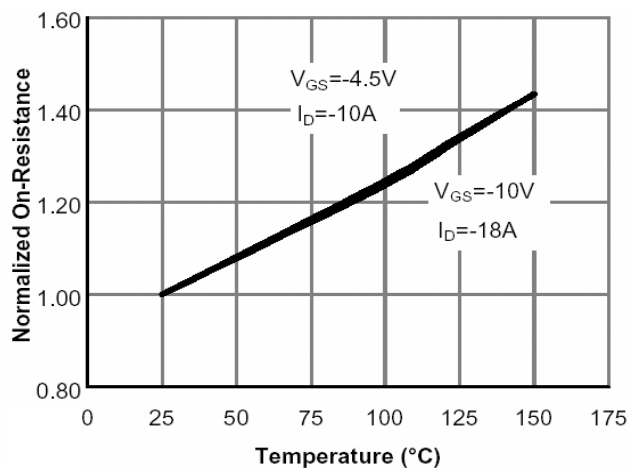


Fig 4. On-Resistance v.s. Junction Temperature

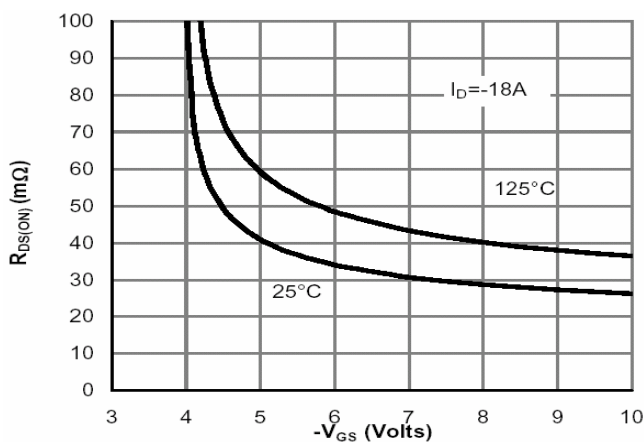


Fig 5. On-Resistance v.s. Gate-Source Voltage

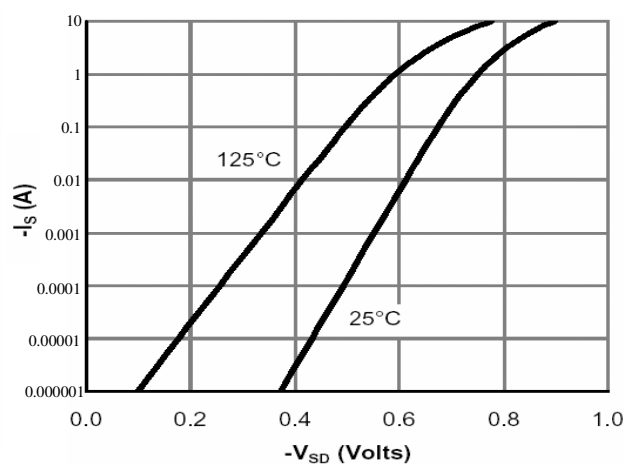


Fig 6. Body Diode Characteristics

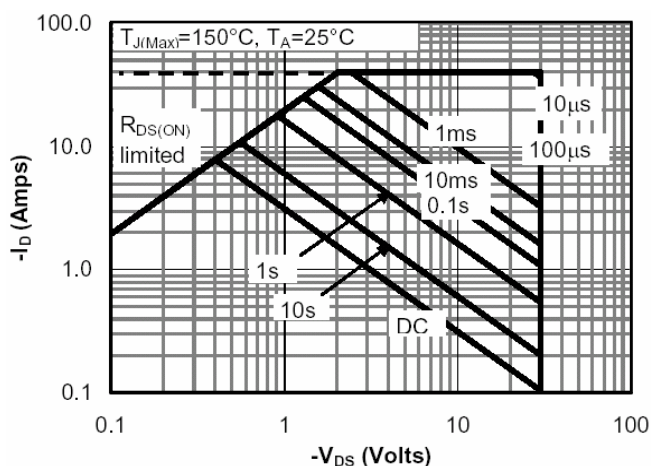


Fig 7. Maximum Safe Operating Area

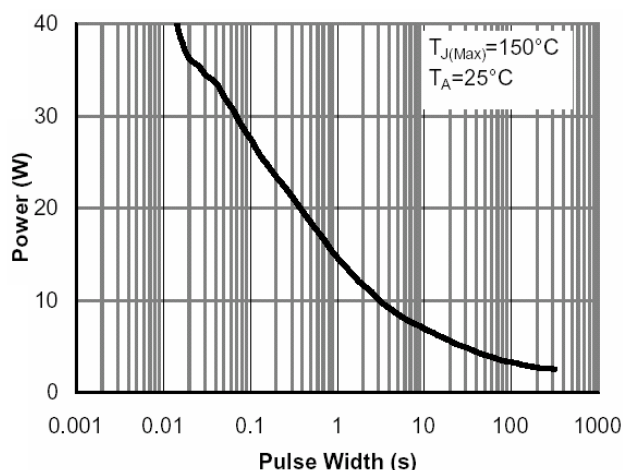


Fig 8. Single Pulse Power Rating Junction-to-Ambient

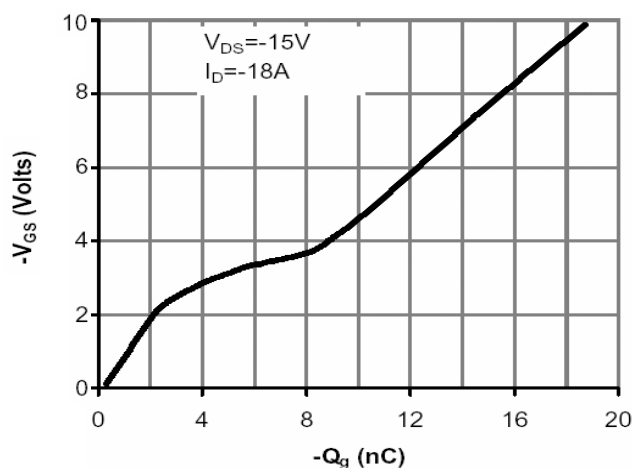


Fig 9. Gate Charge Characteristics

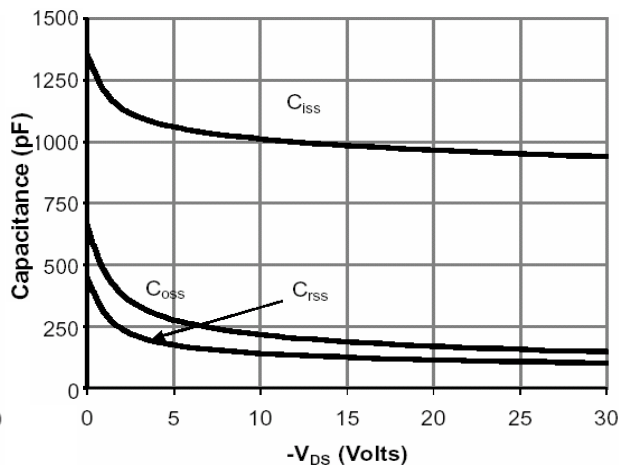


Fig 10. Typical Capacitance Characteristics

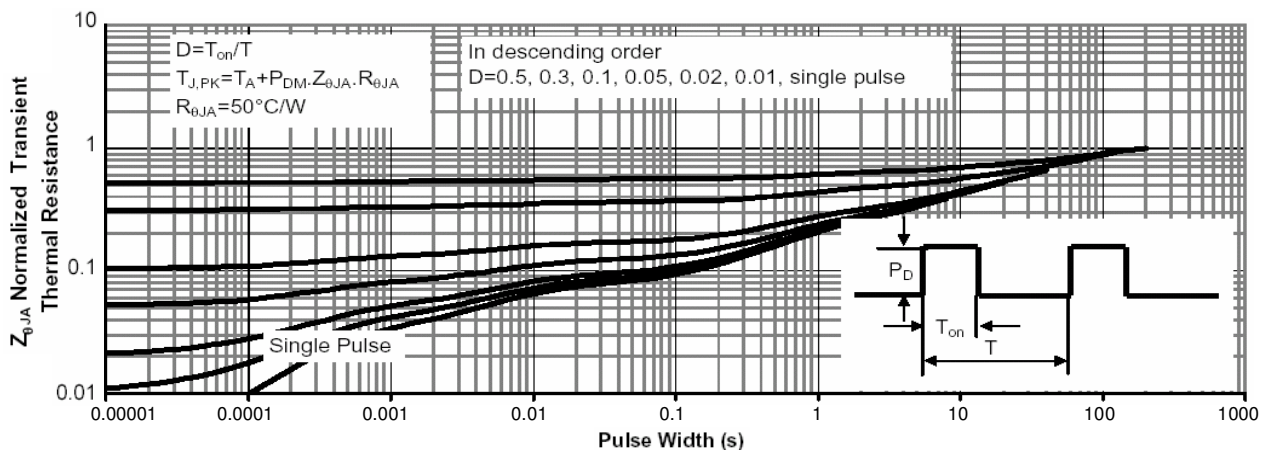


Fig 11. Normalized Maximum Transient Thermal Impedance