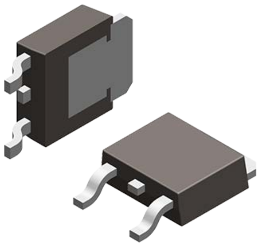
PAN2090

N-Ch 20V Fast Switching MOSFETs

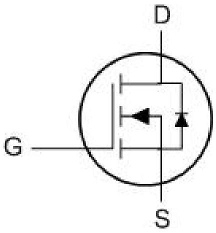
Product Summary

BVDSS	RDSON	ID
20V	2.7 mΩ	100A



TO252

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25˚C	Continuous Drain Current, V_{GS} @ 10V[1]	100	A
I_D@T_C=100˚C	Continuous Drain Current, V_{GS} @ 10V[1]	59	A
I_{DM}	Pulsed Drain Current[2]	360	A
EAS	Single Pulse Avalanche Energy[3]	118	mJ
I_{AS}	Avalanche Current	41	A
P_D@T_C=25˚C	Total Power Dissipation[4]	88	W
T_{STG}	Storage Temperature Range	-55 to 150	˚C
T_J	Operating Junction Temperature Range	-55 to 150	˚C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	1.8	˚C/W

Ver.1.0

Electrical Characteristics (T_J=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	V_{GS}= ±12V, V_{DS}=0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	0.4	0.7	1.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance note3	V_{GS}=4.5V, I_D=30A	-	2.7	4	mΩ
		V_{GS}=2.5V, I_D=20A		4	6	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=10V, V_{GS}=0V, f=1.0MHz	-	3200	-	pF
C_{oss}	Output Capacitance		-	460	-	pF
C_{rss}	Reverse Transfer Capacitance		-	445	-	pF
Q_g	Total Gate Charge	V_{DS}=10V, I_D=30A, V_{GS}=4.5V	-	48	-	nC
Q_{gs}	Gate-Source Charge		-	3.6	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	19	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS} =10V, I_D=30A, R_G=1.8Ω, V_{GS}=4.5V	-	9.7	-	ns
t_r	Turn-On Rise Time		-	37	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	63	-	ns
t_f	Turn-Off Fall Time		-	52	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	100	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	360	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_{SD}=30A, T_J=25℃	-	-	1.2	V
t_{rr}	Reverse Recovery Time	T_J=25°C, I_F=30A, di/dt =100A/μs	-	23	-	ns
Q_{rr}	Reverse Recovery Charge		-	10	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: T_J=25℃, V_{DD}=15V, V_G=4.5V, R_G=25Ω, L=0.5mH, I_{AS}=21A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Typical Performance Characteristics

Figure1: Output Characteristics

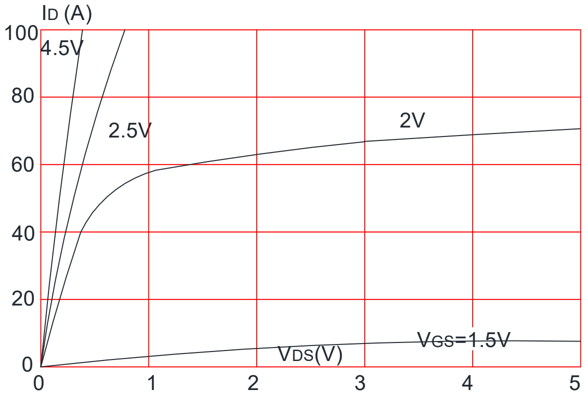


Figure 2: Typical Transfer Characteristics

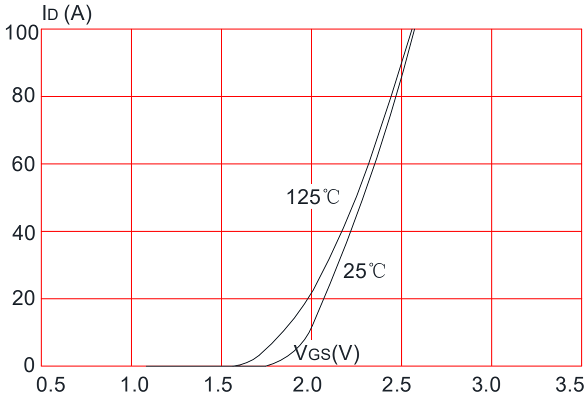


Figure 3: On-resistance vs. Drain Current

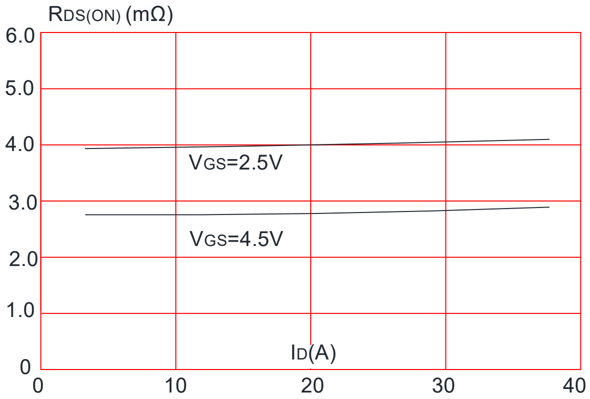


Figure 4: Body Diode Characteristics

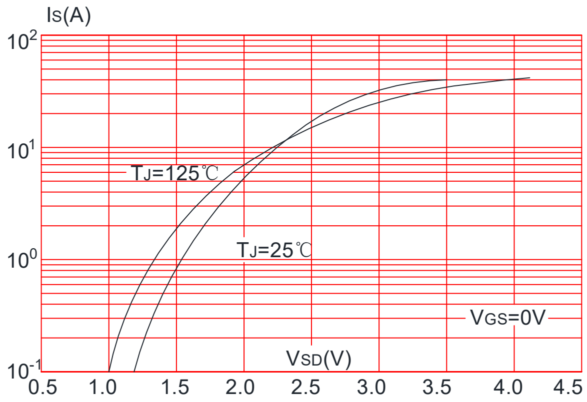


Figure 5: Gate Charge Characteristics

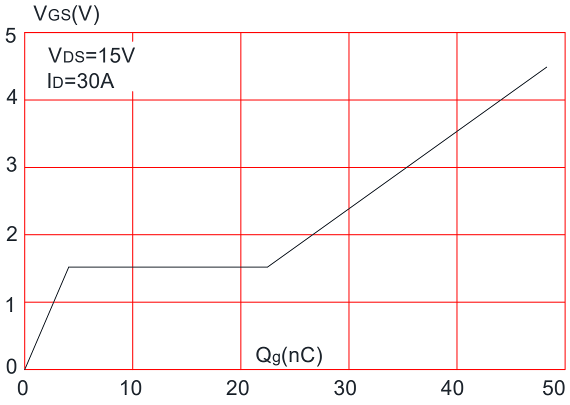


Figure 6: Capacitance Characteristics

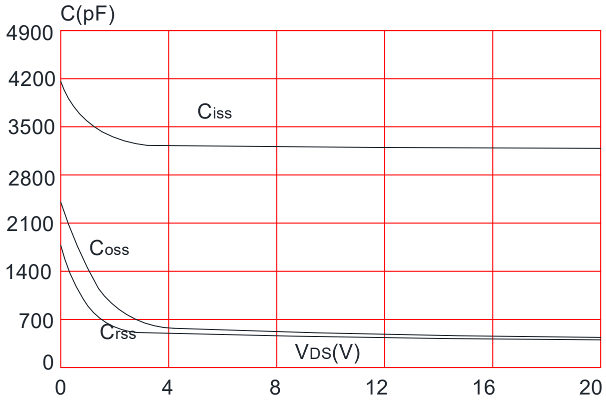


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

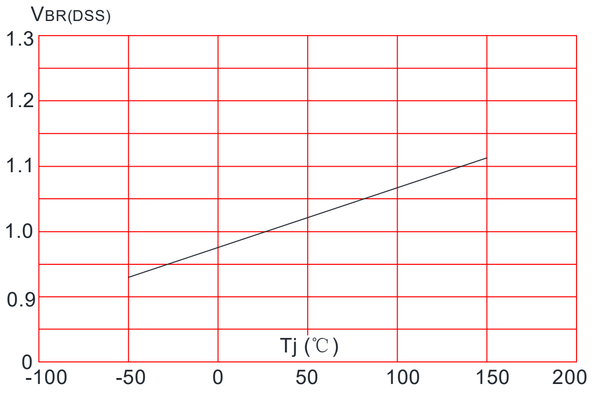


Figure 8: Normalized on Resistance vs. Junction Temperature

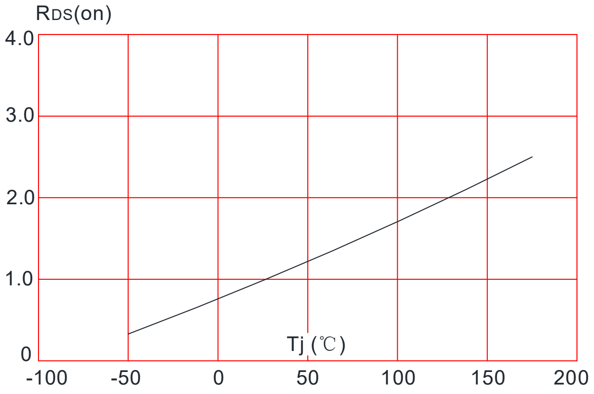


Figure 9: Maximum Safe Operating Area

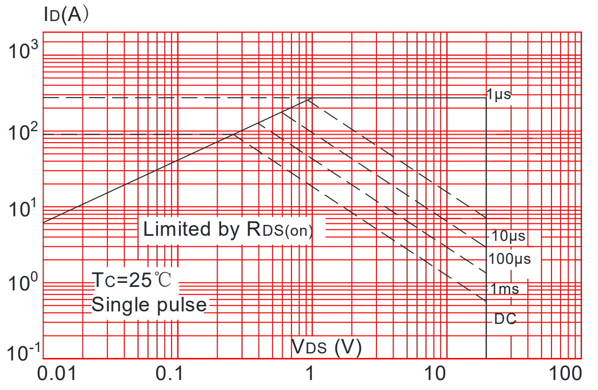


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

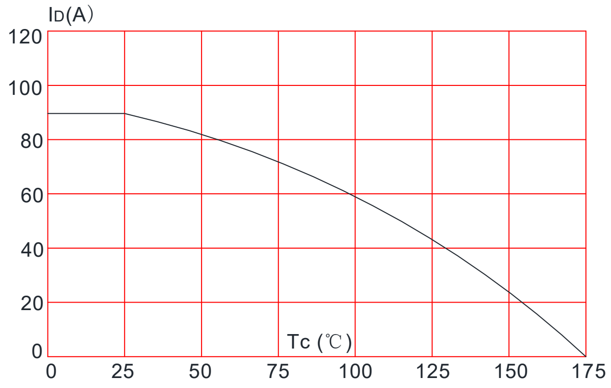
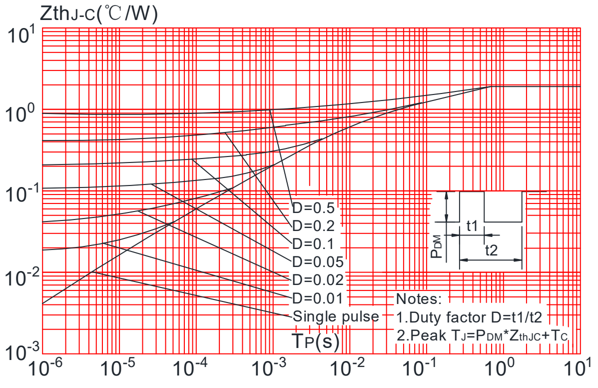
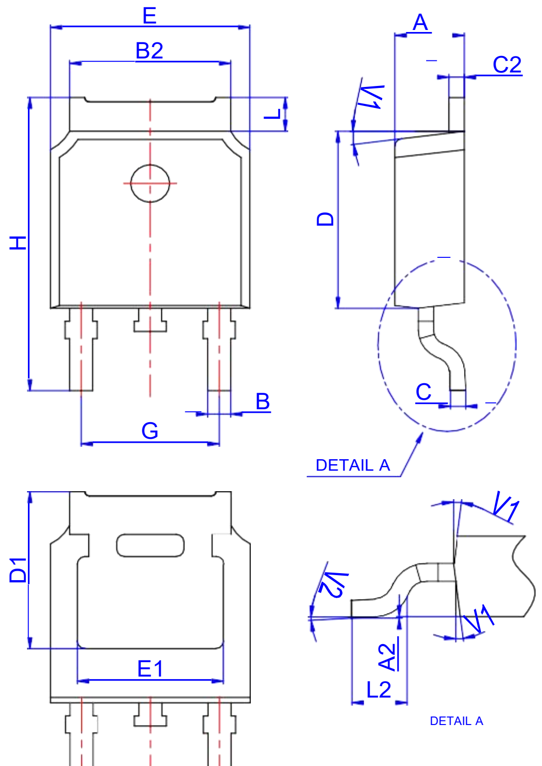


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Notes:
1.Duty factor D=t1/t2
2.Peak $T_J=P_{DM}*Z_{thJC}+T_C$

Package Mechanical Data TO 252 3R



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°