FM4040(文件编号：S&CIC1927) 40V N-Channel Trench Power MOSFET

Description

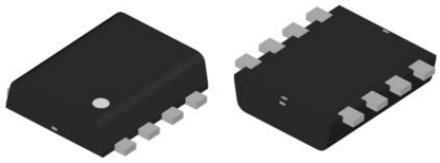
Features

- Extremely Low RDS(on):
- Typ.RDS(on) =5.6mΩ @VGS=10 V, Id=40 A
- Good stability and uniformity
- 100% avalanche tested
- Excellent package for good heat dissipation

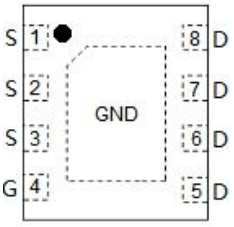
General Description

The FM4040 uses advanced trench technology to provide excellent RDS(ON), low gate charge This device is suitable for use in UPS, power switching and general purpose applications.

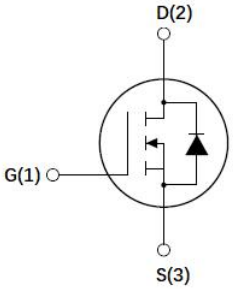
Package



PDFN3X3-8L



Marking and pin Assignment



Schematic Diagram

Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter		Max.	Units
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C = 25℃	40	A
		T_C = 100℃	28	A
I_{DM}	Pulsed Drain Current note1		160	A
E_{AS}	Single Pulsed Avalanche Energy note2		130	mJ
P_D	Power Dissipation	T_C = 25℃	40	W
			0.85	W/℃
$R_{\theta JC}$	Thermal Resistance, Junction to Case		2.24	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	℃

* Drain current limited by maximum junction temperature.

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	40	45		V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 30 V, V_{GS} = 0 V			1	μA
I_{GSSF}	Gate Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate Leakage Current, Reverse	V_{GS} = -20 V, V_{DS} = 0 V	100			nA
On Characteristics						
$V_{GS(TH)}$	Gate Threshold voltage	V_{DS} = VGS, I_D = 250 uA	1.2	1.7	2.2	V
$R_{DS(On)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 40 A		5.6	7.0	mΩ
		V_{GS} = 4.5 V, I_D = 20 A		7.5	10.5	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 24 A (Note 3)	12			S
Dynamic Characteristics						
Ciss	Input capacitance	V_{DS}=20V, V_{GS}=0V, F=1.0Mhz		1800		pF
Coss	Output capacitance			140		pF
Crss	Reverse transfer capacitance			125		pF
Switching Characteristics						
td(on)	Turn On Delay Time	V_{DD}=20V, I_D=20A, V_{GS}=10V, R_G=3Ohm (Note 3, 4)		5		ns
tr	Rising Time			27		ns
td(off)	Turn Off Delay Time			12		ns
tf	Fall Time			23		ns
Qg	Total Gate Charge	V_{DD}=20V, I_D=20A, V_{GS}=10V (Note 3, 4)		34		nC
Qgs	Gate-Source Charge			4.8		nC
Qgd	Gate-Drain Charge			7.2		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current				40	A
V_{SD}	Diode Forward Voltage	V_{GS}= 0 V, I_S = 10A			1.2	V
Trr	Reverse recovery time	IF=20A, di/dt=100A/μS		16		ns
Qrr	Reverse recovery charge			11		nC

Notes:
Repetitive Rating : Pulse width limited by maximum junction temperature
L = 0.5 mH, I_{AS} = 35 A, V_{DD} = 20V, R_G = 25 Ω, Starting Tj = 25°C
I_{SD} ≤ 40A, di/dt = 100A/us, V_{DD} ≤ B_{VDSS}, Staring Tj =25°C
Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
Essentially independent of operating temperature

Typical Performance Characteristics

Figure1: Output Characteristics

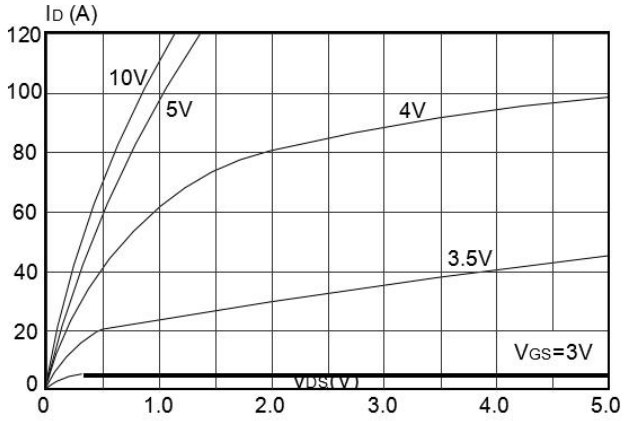


Figure 2: Typical Transfer Characteristics

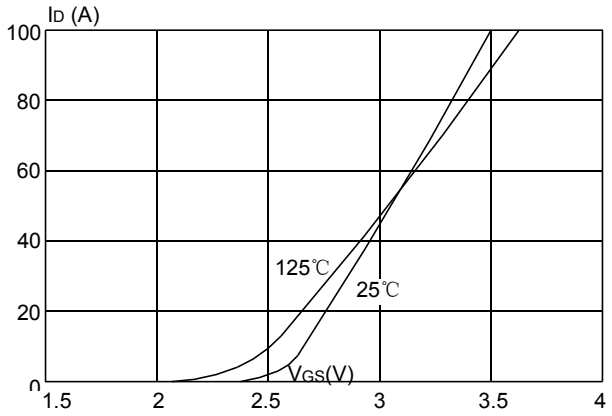


Figure 3: On-resistance vs. Drain Current

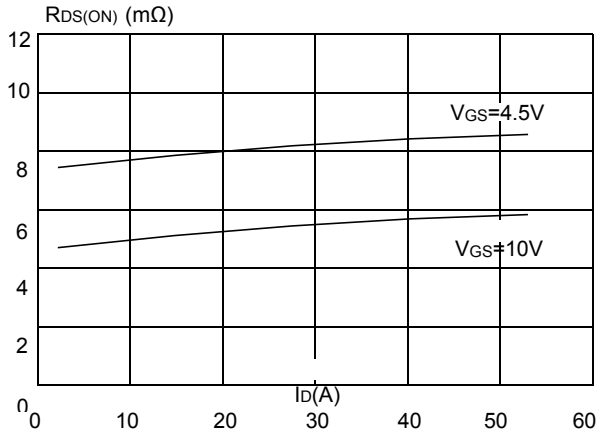


Figure 4: Body Diode Characteristics

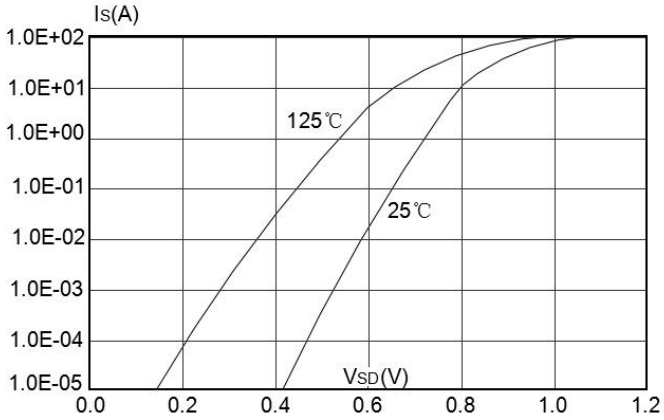


Figure 5: Normalized Breakdown Voltage vs. Junction Temperature

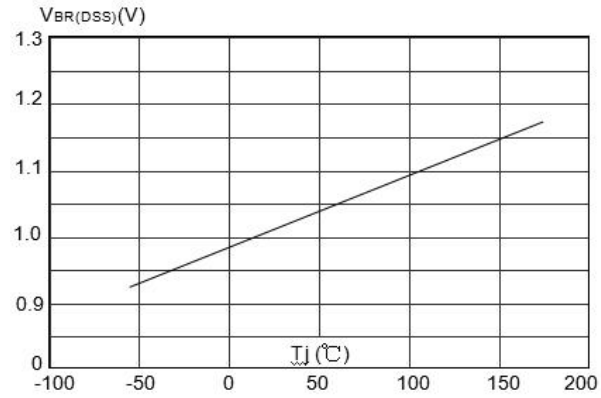


Figure 6: Normalized on Resistance vs. Junction Temperature

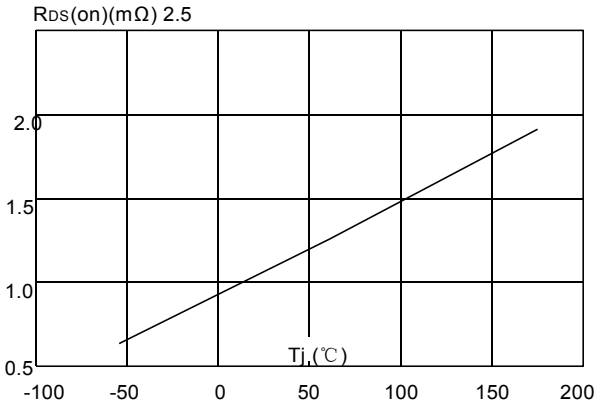


Figure 7: Maximum Safe Operating Area

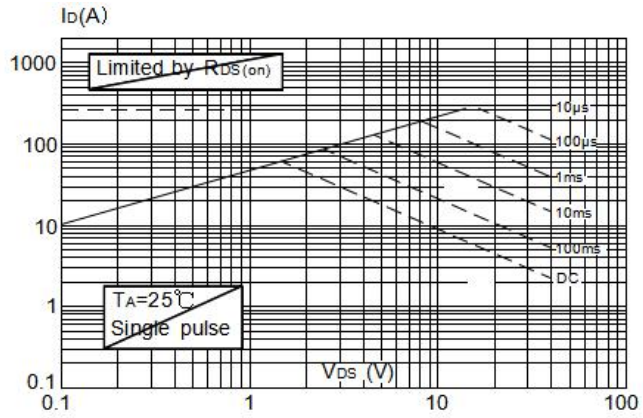


Figure 8: Maximum Continuous Drain Current vs. Case Temperature

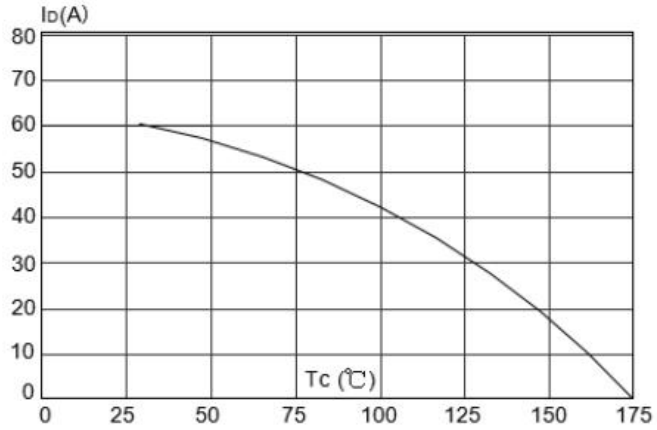
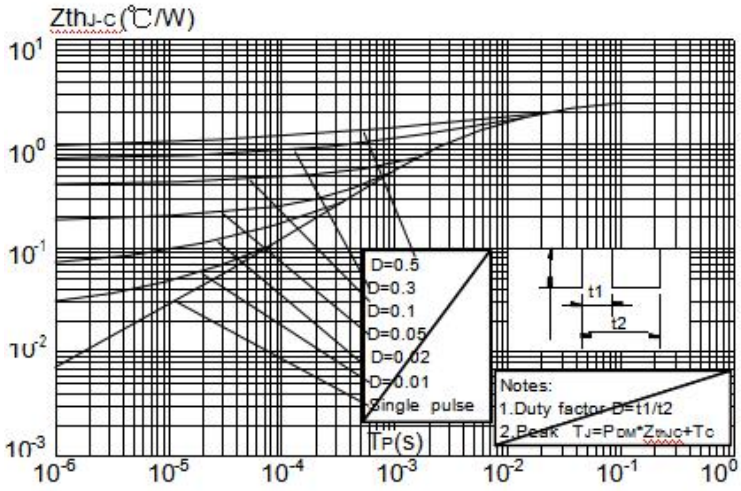
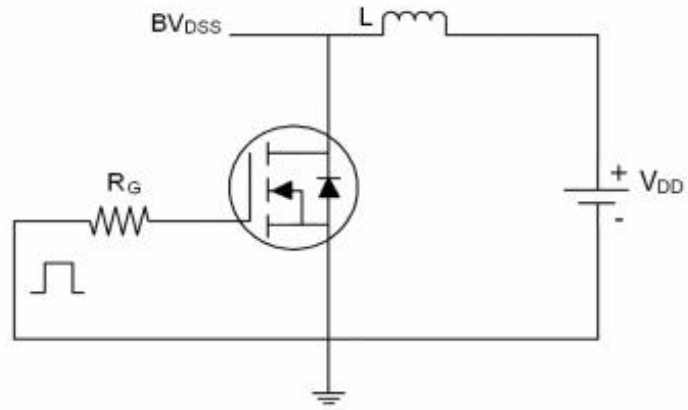


Figure.9: Maximum Effective Transient Thermal Impedance, Junction-to-Case

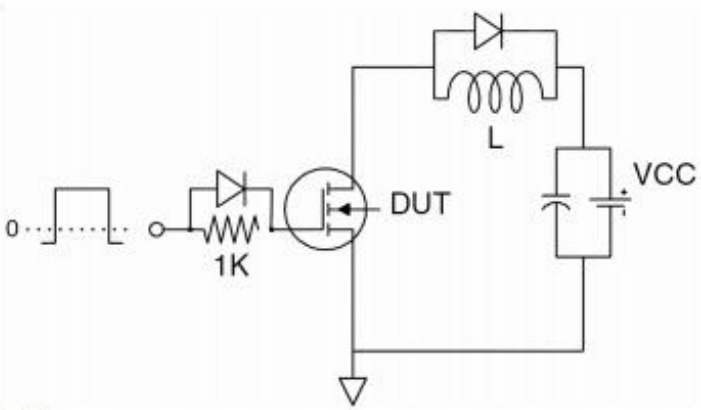


Test Circuit

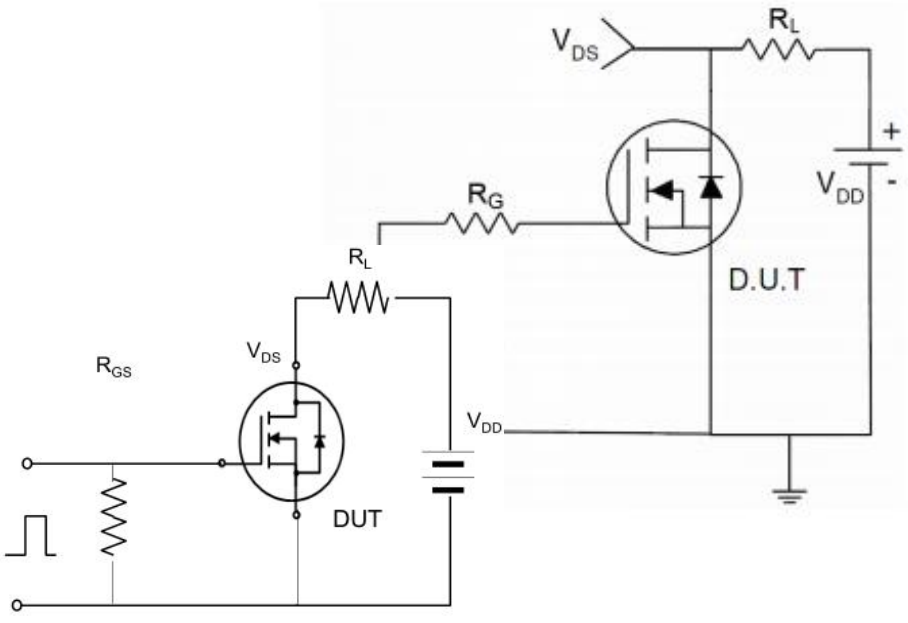
1) E_{AS} Test Circuits



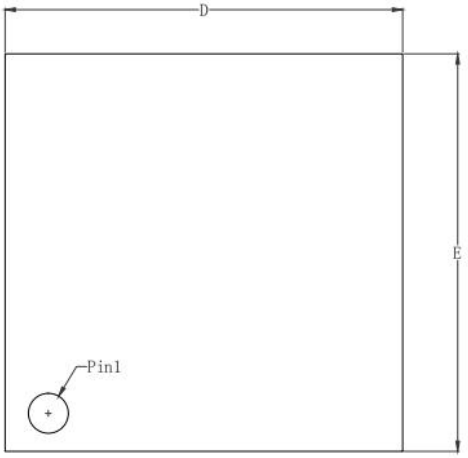
2) Gate Charge Test Circuit:



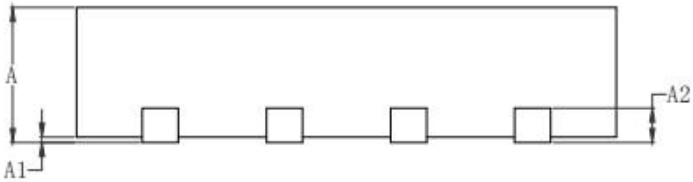
3) Switch Time Test Circuit:



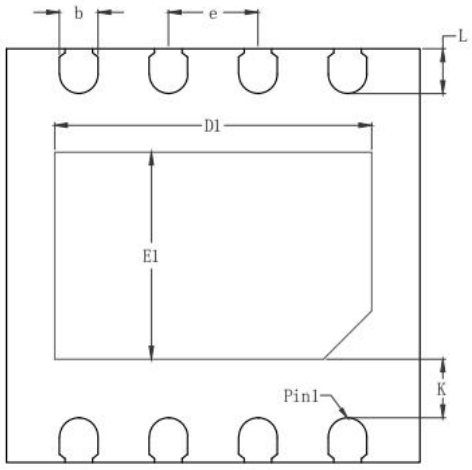
Package Mechanical Data- PDFN3X3-8



TOP-VIEW:



SIDE-VIEW:



BOTTOM-VIEW:

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.80	0.85	0.90
A1	0.00	0.02	0.05
A2	0.203REF.		
b	0.23	0.28	0.33
D	2.95	3.00	3.05
E	2.95	3.00	3.05
D1	2.25	2.30	2.35
E1	1.45	1.50	1.55
e	0.60	0.65	0.70
L	0.28	0.33	0.38
K	0.38	0.43	0.48