40V N Channel Enhancement Mode Power MOSFET

Feature

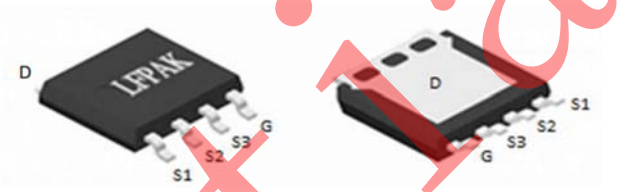
- Extra Low Rds-on
- Robust with good EAS design

Product information

V_{DSS}	40	V
$R_{DS(ON)-typ}$	0.48	mΩ
I_D	391	A

Applications

- Motor/BLDC
- SR for Server/Telecom
- BMS



LFPAK5*6

Absolute Maximum Ratings (T_c=25°C Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		±20	
I_{DM}④	Pulse Drain Current Tested		1564	A
I_D④	Continuous Drain Current, Package Limited	Tc=25°C	391	A
		Tc=100°C	247	
P_D④	Maximum Power Dissipation		145.3	W
EAS③	Avalanche Energy, Single Pulse		395	mJ
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-50 to 150	°C

Thermal Characteristics

Symbol	Parameter		Rating	Unit
$Rthj_C$①	Thermal Resistance-Junction to Case max	Steady State	0.86	°C/W
$Rthj_A$①	Thermal Resistance-Junction to Ambient max	Steady State	53.7	°C/W

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Electrical Characteristics (T_c=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=1mA	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V, Tj=25°C	0.05	0.1	1	uA
		V_{DS}=40V, V_{GS}=0V, Tj=125°C	8	10	100	uA
$V_{GS\ (th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250uA	1.50	1.62	1.95	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V		10	100	nA
$R_{DS(ON)}$ ②	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=50A		0.48	0.58	mΩ
		V_{GS}=8V, I_{DS}=50A		0.52	0.63	
		V_{GS}=4.5V, I_{DS}=50A		0.85	1.11	
R_G	Gate Resistance⑤	Open Drain, f=1MHz		1.0		Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance⑤	V_{GS}=0V, V_{DS}=20V, Frequency=1MHz		6387	7000	pF
C_{oss}	Output Capacitance⑤			3599	6119	
C_{rss}	Reverse Transfer Capacitance⑤			65	111	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=20V,I_D=20A, V_{GS}=10V, R_{GEN}=1.6Ω		14		nS
t_r	Turn-on Rise Time			38		
$t_{d(OFF)}$	Turn-off Delay Time			40		
t_f	Turn-off Fall Time			12		
Q_g	Total Gate Charge⑤	V_{DD}=20V,V_{GS}=0…10V, I_D=50A		91	155	nC
Q_{gs}	Gate-Source Charge			17		
Q_{gd}	Gate-Drain Charge⑤			20	34	
Q_g	Total Gate Charge⑤	V_{DD}=20V,V_{GS}=0…4.5V, I_D=50A		45	77	nC
Source-Drain Characteristics						
Is	Diode continuous forward current	T_C =25°C			145	A
$I_{S,pulse}$	Diode pulse current	T_C =25°C			1564	A
V_{SD}	Diode Forward Voltage	I_S=50A, V_{GS}=0V		0.75		V
t_{rr}	Reverse Recovery Time	I_F=50A,V_R=20V, di_F/dt=100A/us		93		nS
Q_{rr}	Reverse Recovery Charge			186		nC

Note ①:The device mounted on 1in² FR4 board with 2 oz copper. Drain current limited by maximum junction temperature and package limited.

Note ②:Pulse test: pulse width≦300us, duty cycle≦2%, Guaranteed by design, not subject to production testing.

Note ③:I_{AS}= 107A, VDD= 40V, R_G= 25Ω, Starting T_J= 25°C

Note ④:P_{tot}=(T_j-T_c)/ R_{thjc}; I_D= (P_{tot}/ $R_{DS(ON)}$)^0.5; I_{DM}= I_D x 4

Note ⑤:Defined by design. Not subject to production test.

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N-Channel Typical Characteristics

Fig.1 Power dissipation

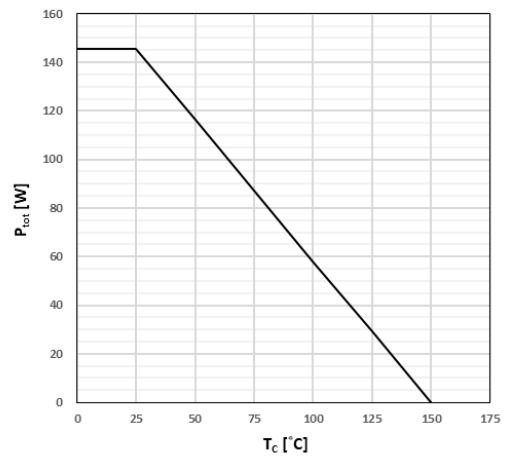


Fig.2 Drain current

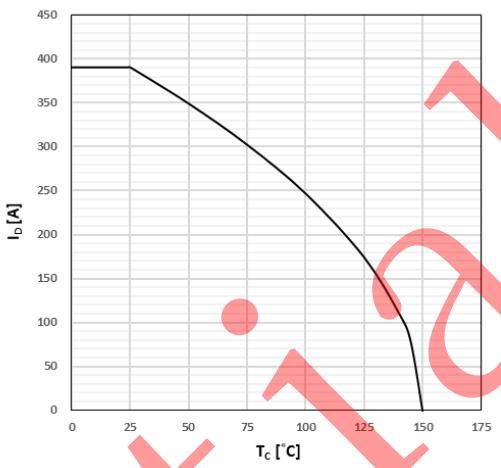


Fig.3 Maximum Safe Operating Area

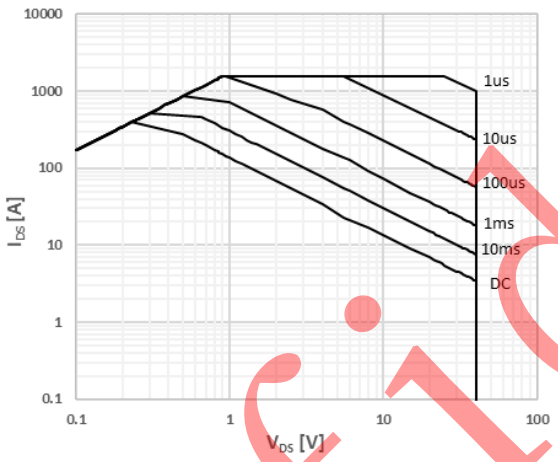


Fig.4 Max. Transient thermal impedance

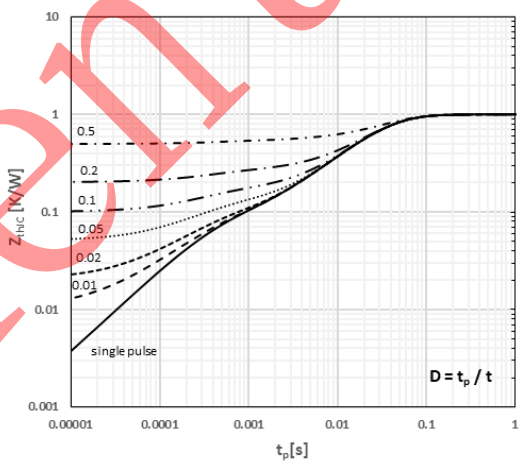


Fig.5 On-Region Characteristics

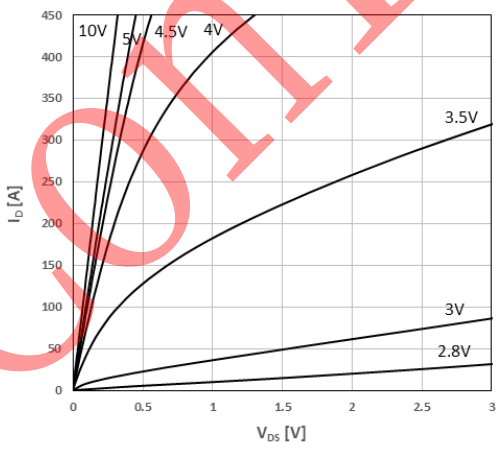
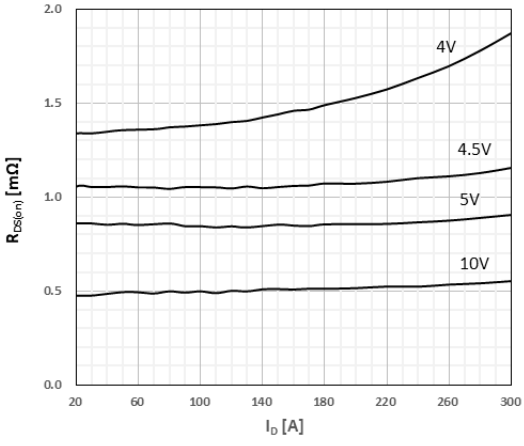


Fig.6 On-Resistance vs. Drain Current



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Fig.7 Transfer Characteristics

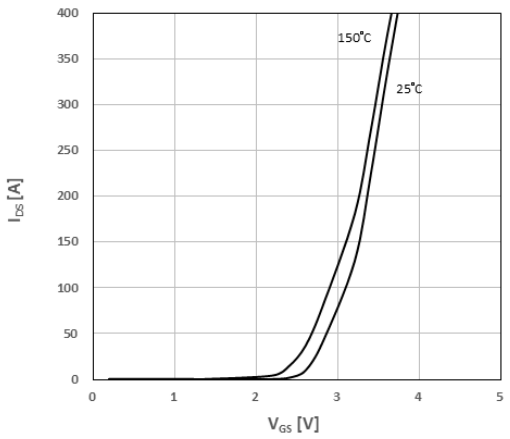


Fig.8 drain-source on resistance

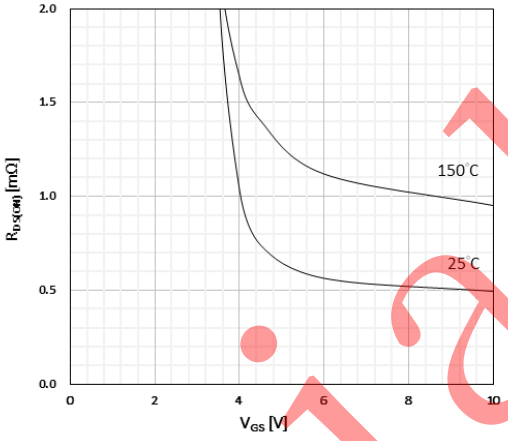


Fig.9 On-Resistance vs. Junction Temp

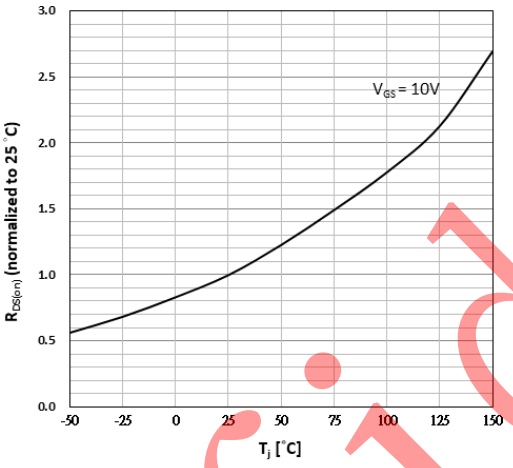


Fig.10 Threshold Voltage

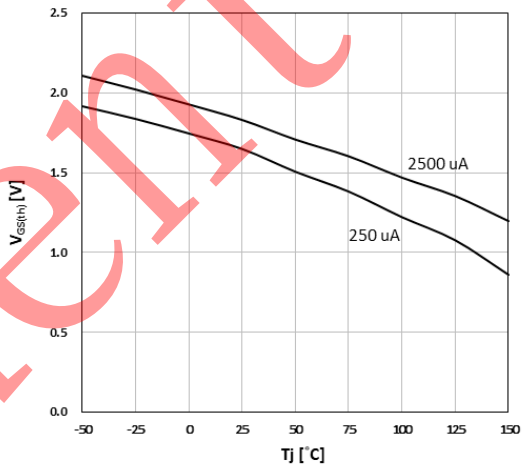


Fig.11 Capacitance

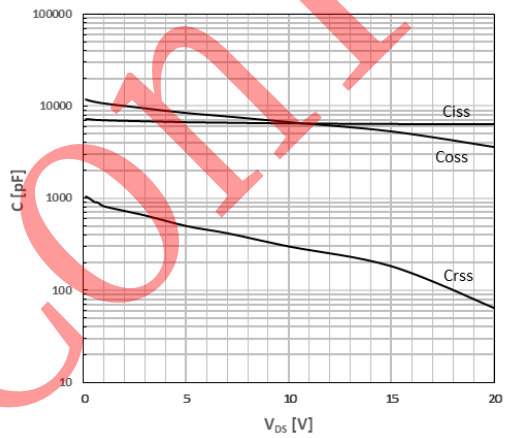
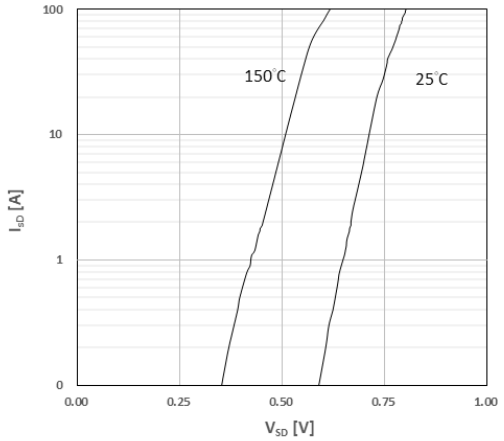


Fig.12 Body-Diode Characteristics



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Fig.13 Avalanche characteristics

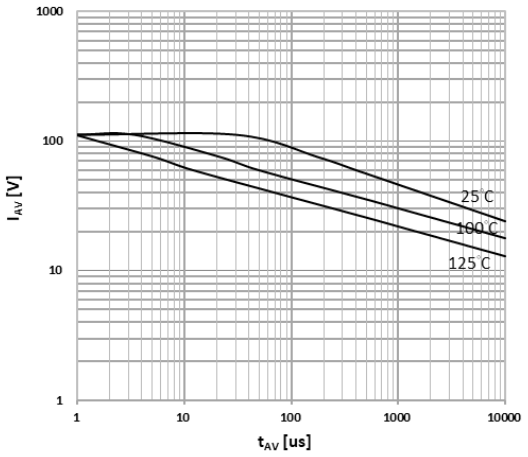


Fig.14 Gate Charge

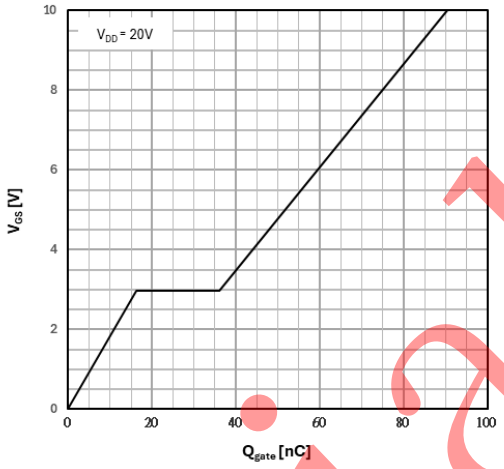
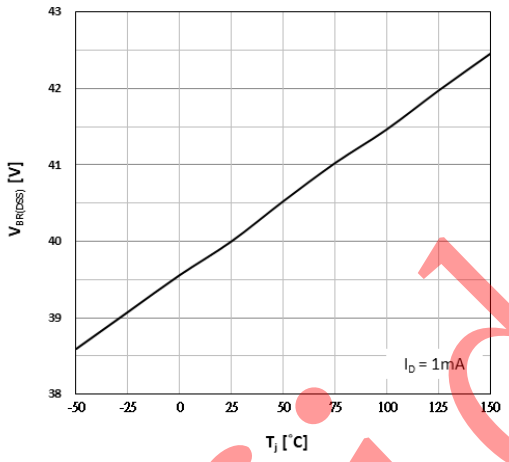
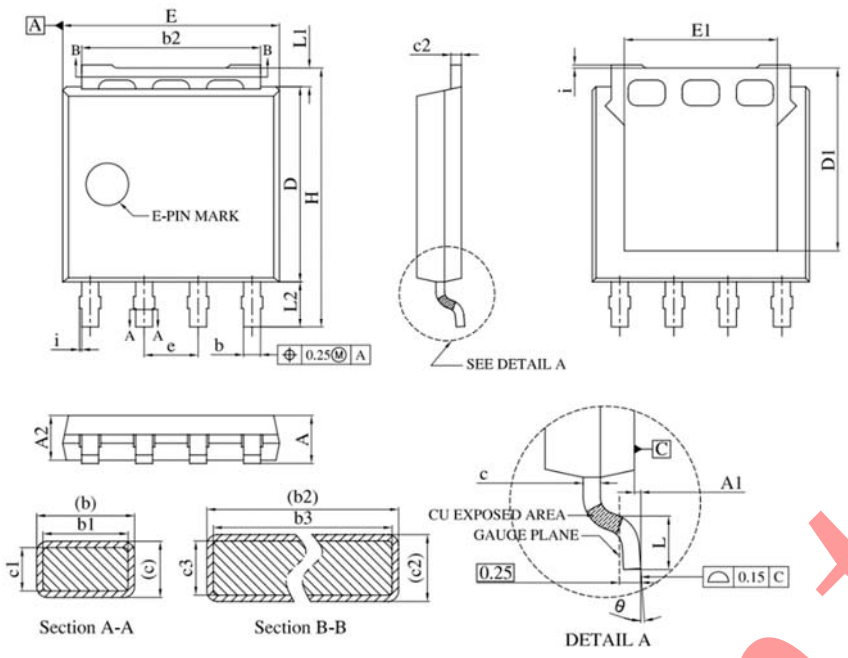


Fig.15 Drain-source breakdown voltage



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Package Outline:



COMMON DIMENSIONS (DIMENSIONS IN MM)			
SYMBOLS	MIN	NOM	MAX
A	1.00	-	1.30
A1	0	0.075	0.15
A2	0.98	1.05	1.12
b	0.35	0.42	0.50
b1	0.32	0.40	0.46
b2	4.02	4.23	4.41
b3	4.00	4.21	4.37
c	0.19	0.22	0.25
c1	0.17	0.20	0.23
c2	0.24	0.27	0.30
c3	0.22	0.25	0.28
D	4.45	-	4.70
D1	-	-	4.45
E	4.95	-	5.30
E1	3.50	-	3.70
e	1.27 BSC		
H	5.95	-	6.25
i	-	-	0.25
L	0.40	-	0.85
L1	0.270	-	0.57
L2	0.80	-	1.30
θ	0°	-	8°

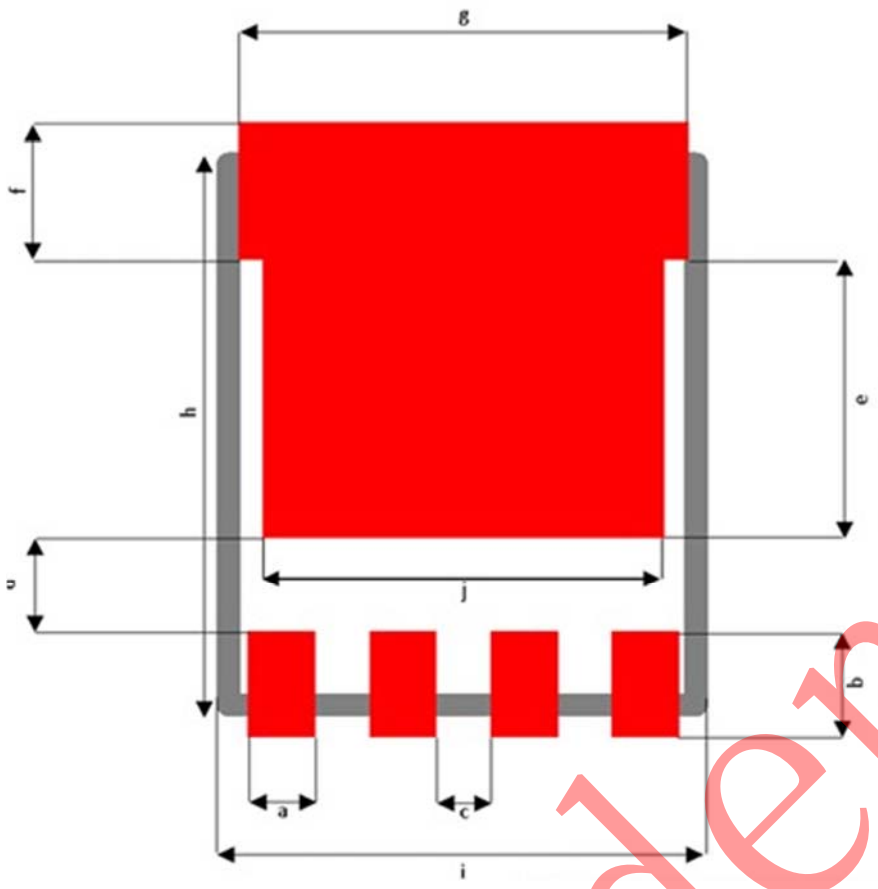
NOTES:

1. ALL DIMENSIONS REFER TO JEDEC STANDARDMO-240 AA
   MOLD FLASH OR PROTRUSIONS OF 0.13 MM MAXIMUM PER SIDE ARE NOT INCLUDED.

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Footprint:



Length	Value (mm)
a	0.700
b	1.150
c	0.570
d	1.050
e	3.100
f	1.500
g	4.700
h	6.000
i	4.900
j	4.200

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Revision History:

Revision	Date	Description of change
P001	2025/01/14	Preliminary version setup
P002	2025/02/05	Update I_{DM}、I_D 、P_D 、Eas、Rthjc、Rthja、Is、$I_{S,pulse}$
P003	2025/03/13	Add characteristics;修改 $Rthj_C$ 、$Rthj_A$ 、I_D、I_{DM}
P004	2025/03/18	Add Capacitance
P005	2025/03/25	Add footprint、Idss 和 Vth 的上下 limit
P006	2025/05/08	Modify C_{iss} 和 C_{oss}的 Max spec
P007	2025/05/19	Modify C_{oss}的 Max spec
P008	2025/07/03	Update Maximum Safe Operating Area

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