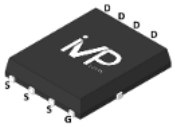
indiaVP Semiconductor Pvt. Ltd.

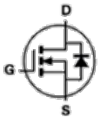
VPLMDF7051

N-Channel Enhancement Mode MOSFET

PDFN5*6



Symbol



Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(ON)\text{-}Max}$	4.4	mΩ
I_D	142	A

Key Features

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- 100% UIS and Rg Tested

Applications

- Power Management in DC/DC Converters
- USB Power Delivery (USB PD)

Ordering Information

Ordering part Number	Marking code	Package	Form
VPLMDF7051	7051	PDFN5*6	Tape & Reel

Absolute Maximum Ratings (T_J= 25°C, unless otherwise specified)

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Maximum Junction Temperature		T_J	150	°C
Storage Temperature Range		T_{STG}	-55 to 150	°C
Diode Continuous Forward Current	T_C=25°C	I_S	113	A
Pulse Drain Current Tested	T_C=25°C	I_{DM}(1)	400	A
Continuous Drain Current	T_C=25°C	I_D	142	A
	T_C=100°C		107	
Maximum Power Dissipation	T_C=25°C	P_D	125	W
	T_C=100°C		50	
Continuous Drain Current	T_A=25°C	I_D	24.3	A
	T_A=70°C		19.5	
Maximum Power Dissipation	T_A=25°C	P_D	2.6	W
	T_A=70°C		1.7	
Avalanche Current, Single pulse	L=0.1mH	I_{AS}(2)	57	A
	L=0.5mH		30	
Avalanche Energy, Single pulse	L=0.1mH	E_{AS}(2)	162	mJ
	L=0.5mH		225	

Thermal Characteristics

Parameter		Symbol	Rating	Unit
Thermal Resistance-Junction to Case	Steady State	$R_{\theta JC}$	1	°C/W
Thermal Resistance-Junction to Ambient	Steady State	$R_{\theta JA}$(3)	48	°C/W

- (1) Max. current is limited by bonding wire
- (2) UIS tested and pulse width are limited by maximum junction temperature 150°C
- (3) Surface Mounted on 1in² FR-4 board with 1oz.

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

Static Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	100	-	-	V	V_{GS}=0V, I_{DS}=250uA
Zero Gate Voltage Drain Current	I_{DSS}	-	-	1	uA	V_{DS}=80V, V_{GS}=0V
Gate Threshold Voltage	$V_{GS(th)}$	2	3	4	V	V_{DS}=V_{GS}, I_{DS}=250uA
Gate Leakage Current	I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
Drain-Source On-state Resistance	$R_{DS(ON)}$ (4)	-	3.6	4.4	mΩ	V_{GS}=10V, I_{DS}=20A
Forward Transconductance	g_{fs}	-	22	-	S	V_{DS}=5V, I_{DS}=10A

Dynamic Characteristics(5)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Gate Resistance	R_G	-	0.6	-	Ω	V_{GS}=0V,V_{DS}=0V, Freq.=1MHz
Input Capacitance	C_{iss}	-	4175	-	pF	V_{GS}=0V, V_{DS}=50V, Freq.=1MHz
Output Capacitance	C_{oss}	-	1190	-		
Reverse Transfer Capacitance	C_{rss}	-	35	-		
Turn-on Delay Time	$t_{d(ON)}$	-	12.8	-	nS	V_{GS}=10V,V_{DS}=25V, I_D=1A,R_{GEN}=3Ω
Turn-on Rise Time	t_r	-	6.3	-		
Turn-off Delay Time	$t_{d(OFF)}$	-	40	-		
Turn-off Fall Time	t_f	-	65	-		

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Total Gate Charge	Q_g	-	48	-	nC	V_{GS}=6V,V_{DS}=50V, I_D=20A
		-	72.8	-		V_{GS}=10V,V_{DS}=50V, I_D=20A
Gate-Source Charge	Q_{gs}	-	21.5	-		
Gate-Drain Charge	Q_{gd}	-	20.7	-		

Source Drain Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Diode Forward Voltage	V_{SD} (4)	-	0.75	1.1	V	I_{SD}=10A, V_{GS}=0V
Reverse Recovery Time	t_{rr}	-	40.4	-	nS	I_F=10A, V_R=50V & dI_F/dt=100A/μs
Reverse Recovery Charge	Q_{rr}	-	80.2	-	nC	

- (4) Pulse test (pulse width ≤ 300us, duty cycle ≤ 2%).
- (5) Guaranteed by design, not subject to production test

Electrical Characteristics Diagrams

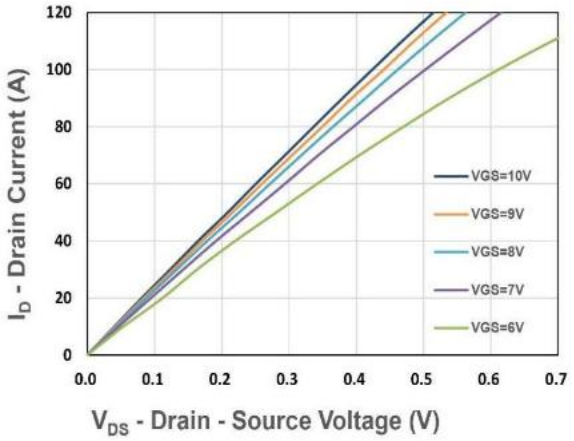


Figure 1. Output Characteristics

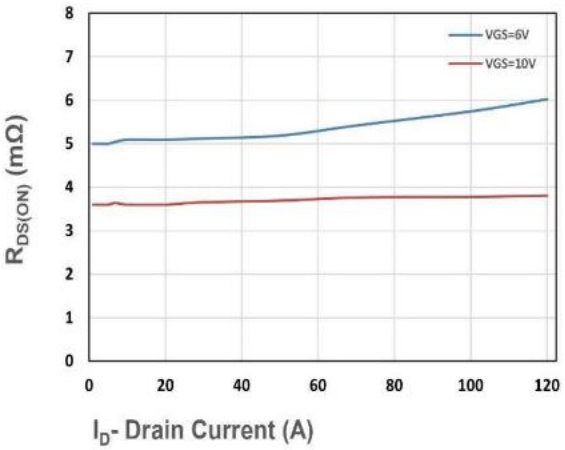


Figure 2. On-Resistance vs. ID

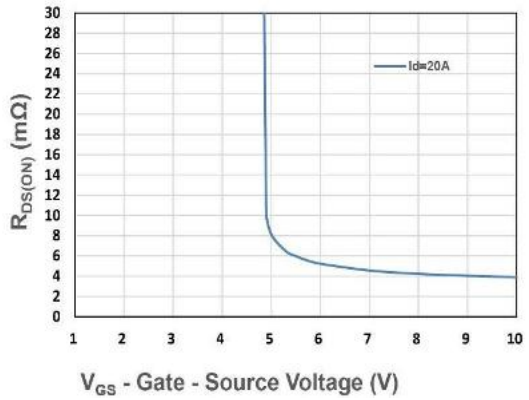


Figure 3. On-Resistance vs. VGS

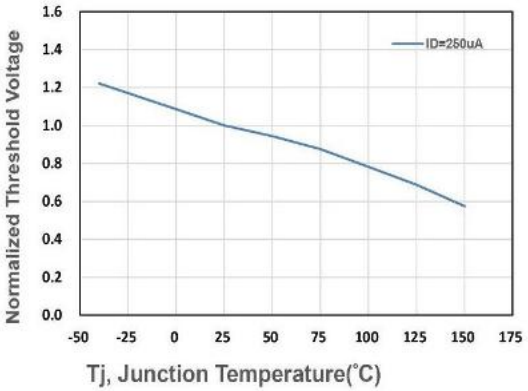


Figure 4. Gate Threshold Voltage

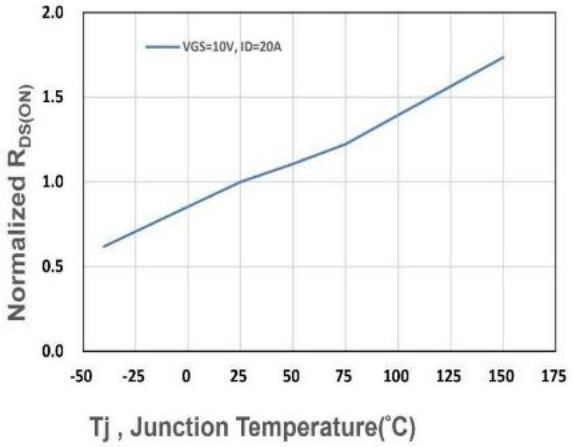


Figure 5. Drain-Source On Resistance

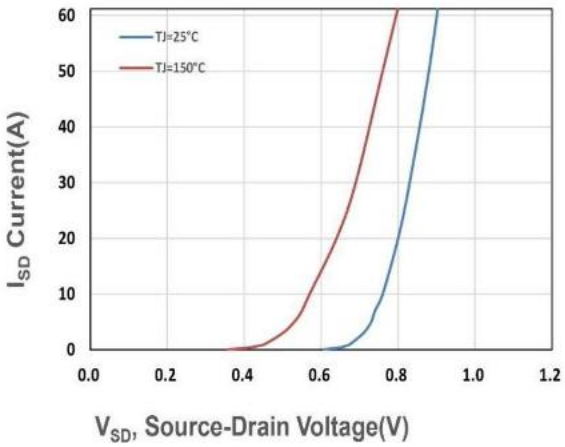


Figure 6. Source-Drain Diode Forward

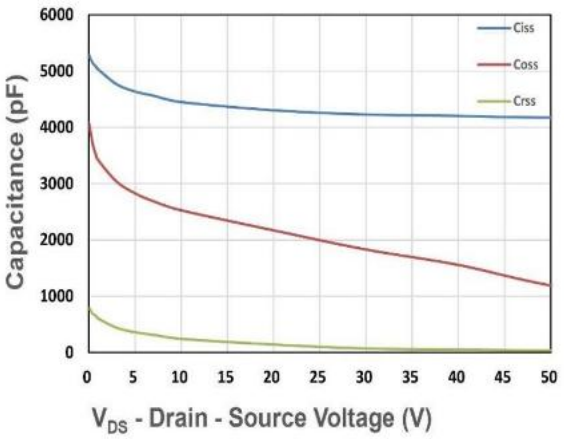


Figure 7. Capacitance

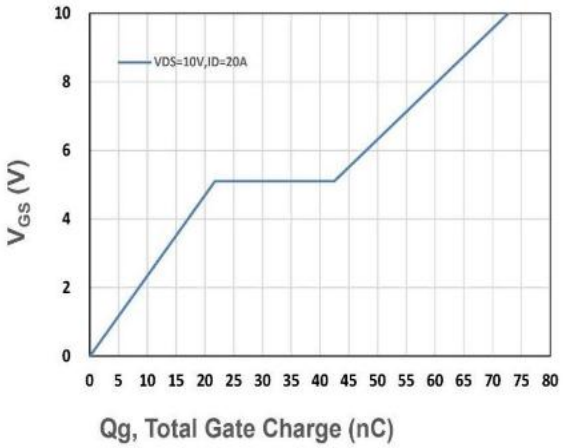


Figure 8. Gate Charge Characteristics

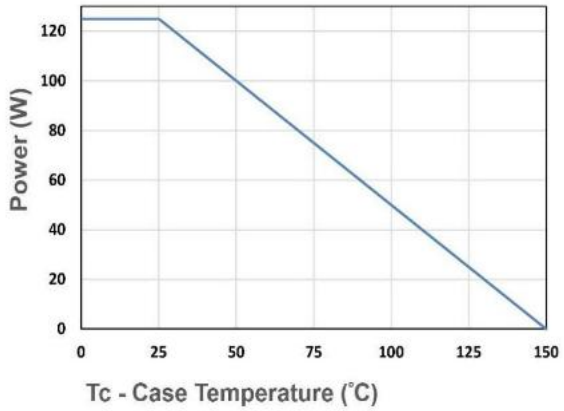


Figure 9. Power Dissipation

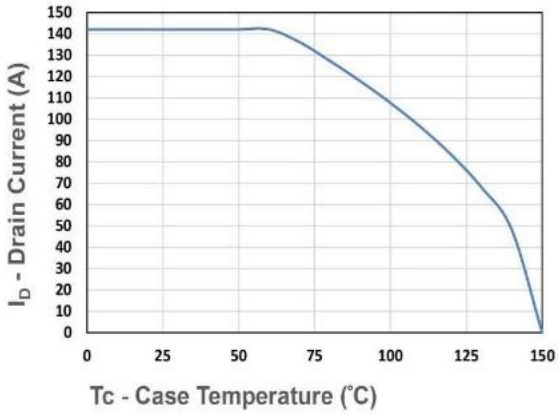


Figure 10. Drain Current

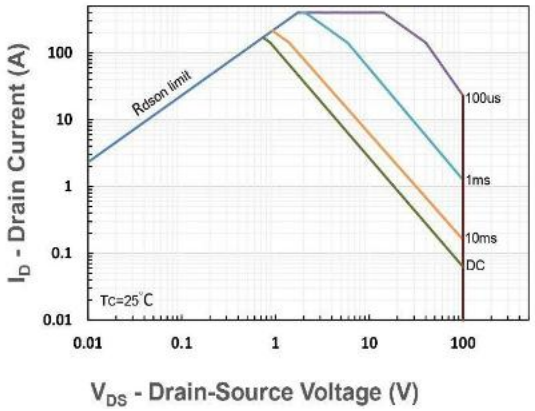


Figure 11. Safe Operating Area

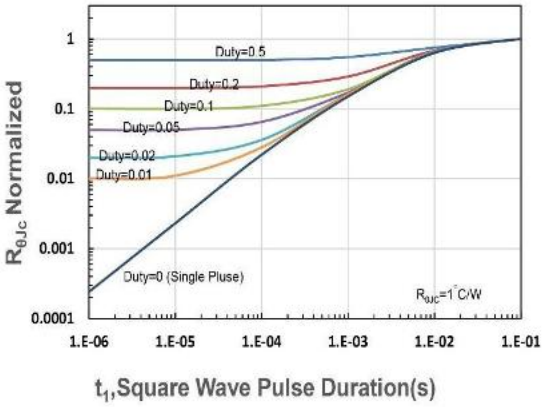
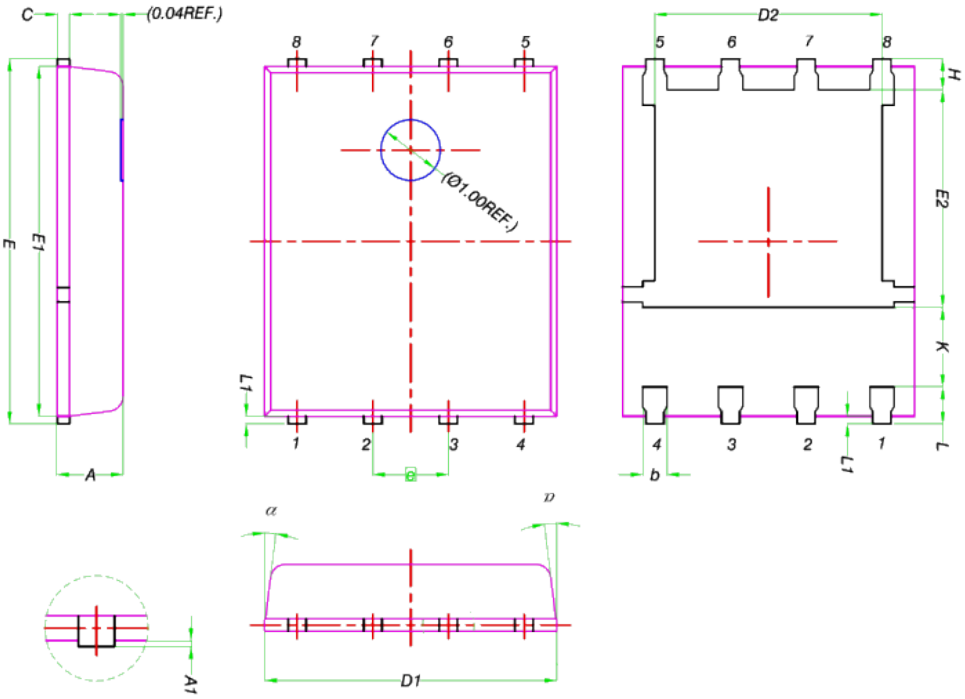


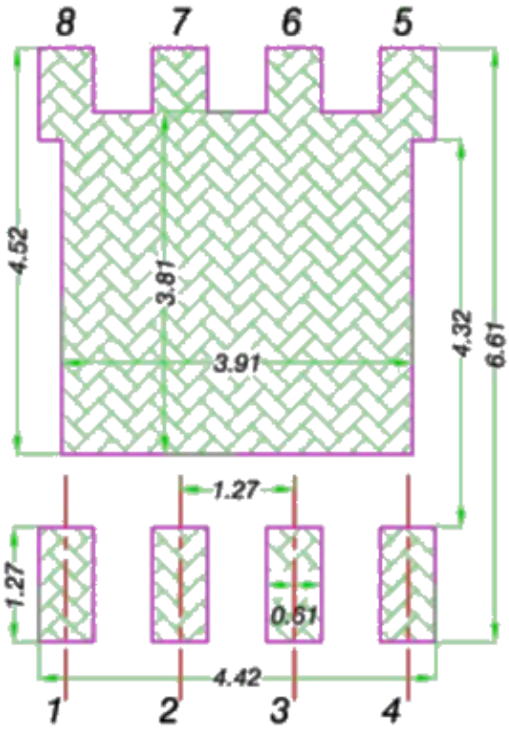
Figure 12. $R_{\theta JC}$ Transient Thermal Impedance

Package Information (PDFN5*6)



Outline dimensions in mm

Unit:mm	Min	Typ	Max
A	0.900	1.000	1.100
A1	0.000	-	0.050
b	0.330	0.410	0.510
C	0.200	0.250	0.300
D1	4.800	4.900	5.000
D2	3.610	3.810	3.960
E	5.900	6.000	6.100
E1	5.700	5.750	5.800
E2	3.380	3.580	3.780
e	1.27 BSC		
H	0.410	0.510	0.610
K	1.100	-	-
L	0.510	0.610	0.710
L1	0.060	0.130	0.200
α	0°	-	12°



Suggested Pad Layout (Unit:mm)

Disclaimer

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