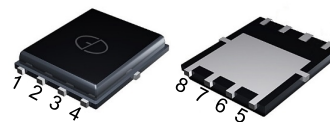


N-Channel 40V (D-S) Power MOSFET

Features

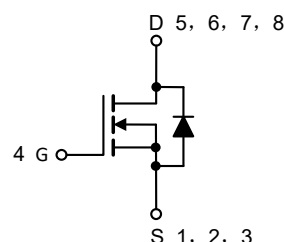
- 100% Avalanche Tested
- Extremely Low Losses with Low FOM $R_{DS(on)} \cdot Q_g$
- RoHS Compliant, Halogen Free, Pb-Free
- MSL 1



PDFN3333

Applications

- Industrial systems
- Motors, lamps and solenoid control
- Ultra high performance power switching



Absolute Maximum Ratings ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain Source Voltage	V_{DS}	40	V
Gate Source Voltage	V_{GS}	± 20	V
Drain Current, Continuous $V_{GS}=10\text{V}$	I_D	$T_C=25^\circ\text{C}$ 128	A
		$T_C=100^\circ\text{C}$ 81	
Drain Current, Pulsed (Note 1)	I_{DM}	513	A
Single Avalanche Energy (Note 2)	E_{AS}	292	mJ
Power Dissipation	P_D	$T_C=25^\circ\text{C}$ 52	W
		$T_C=100^\circ\text{C}$ 21	
Operating Junction/ Storage Temperature Range	T_J / T_{STG}	-55 to +150	$^\circ\text{C}$

Note 1: Single pulse; $t_p \leq 1\text{us}$.

Note 2: $V_{DD} = 20\text{V}$, $V_{GS} = 10\text{V}$, $L = 1\text{mH}$, $R_G = 25\Omega$, starting $T_J = 25^\circ\text{C}$.

Thermal Characteristics

Parameter	Symbol	Max	Unit
Thermal Resistance Junction to Case	R_{thJC}	2.4	$^\circ\text{C/W}$
Thermal Resistance Junction to Ambient (Note 3)	R_{thJA}	50	$^\circ\text{C/W}$

Note 3: Device mounted on 1 square inch FR4 PCB board, with 2oz single-sided copper, in a 25°C still air environment.

Electrical Characteristics (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250μA	40	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V	--	--	1	μA
		V _{DS} =40V, V _{GS} =0V, T _J = 125°C	--	--	100	
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =250μA	1.2	1.7	2.5	V
Gate Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	--	--	±100	nA
Drain-Source On-state Resistance (Note 4)	R _{DS(on)}	V _{GS} =10V, I _D =20A	--	1.6	2	mΩ
		V _{GS} =4.5V, I _D =15A	--	2.4	3	
Total Gate Charge	Q _g	V _{GS(off)} =0V, V _{GS(on)} =10V, V _{DD} =20V, I _D =20A	--	30	--	nC
Gate-Source Charge	Q _{gs}		--	6.3	--	
Gate-Drain Charge	Q _{gd}		--	4.1	--	
Turn-on Delay Time	t _{d(on)}	V _{GS} =10V, V _{DD} =20V, I _D =20A, R _G =3Ω	--	3.6	--	ns
Turn-on Rise Time	t _r		--	6.6	--	
Turn-off Delay Time	t _{d(off)}		--	24	--	
Turn-off Fall Time	t _f		--	10	--	
Gate Resistance	R _g	V _{GS} =0V, f=1MHz, open drain	--	1.7	--	Ω
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =20V, f=1MHz	--	2091	--	pF
Output Capacitance	C _{oss}		--	1260	--	
Reverse Transfer Capacitance	C _{rss}		--	45	--	

Reverse Diode Characteristics (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Current, Continuous	I _{SD}	T _C =25°C	--	--	124	A
Diode Forward Voltage (Note 4)	V _{SD}	I _F =2A, V _{GS} =0V	--	0.7	1.2	V
Reverse Recovery Time	T _{rr}	V _R = 20V, di/dt = 100 A/μs	--	39	--	ns
Reverse Recovery Charge	Q _{rr}		--	43	--	nC

Note 4: Pulse test; pulse width ≤ 380μs, duty cycle ≤ 1%.

Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

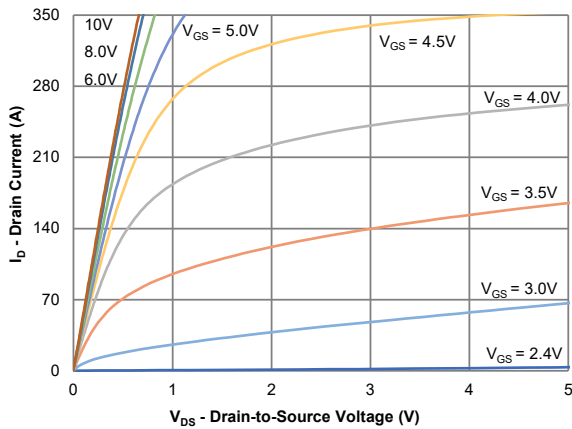


Figure 1: Output Characteristics

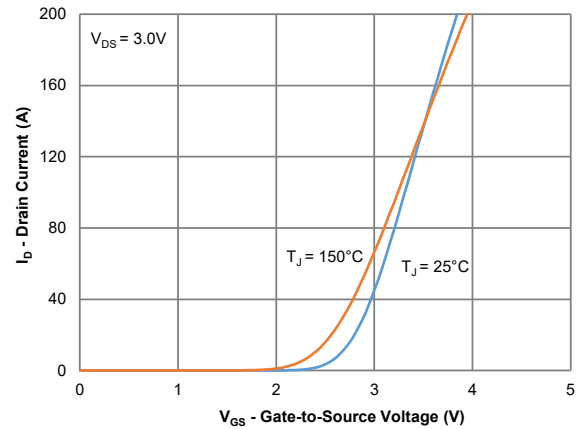


Figure 2: Transfer Characteristics

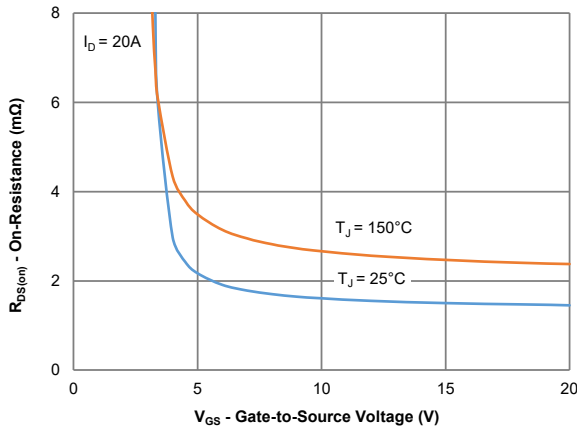


Figure 3: On-Resistance vs. Gate-Source Voltage

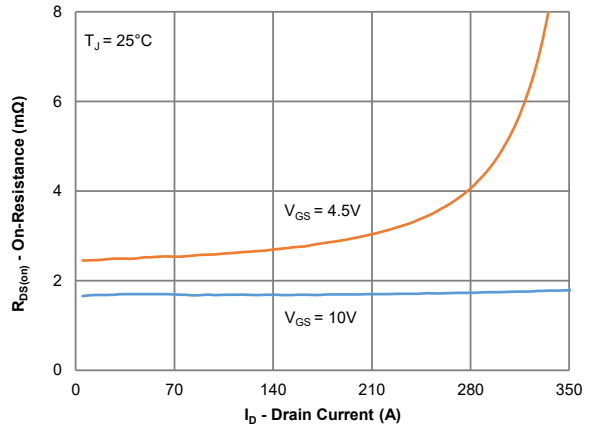


Figure 4: On-Resistance vs. Drain Current and Gate Voltage

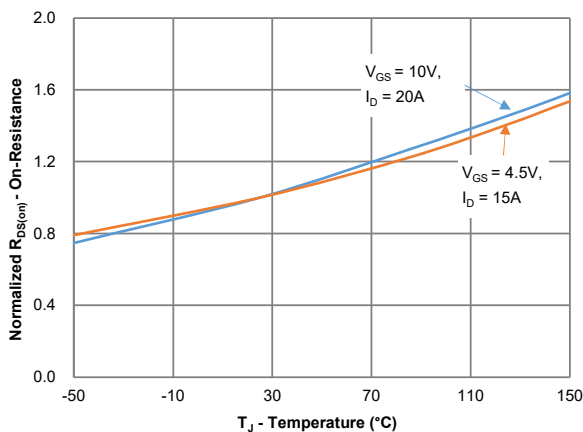


Figure 5: On-Resistance vs. Junction Temperature

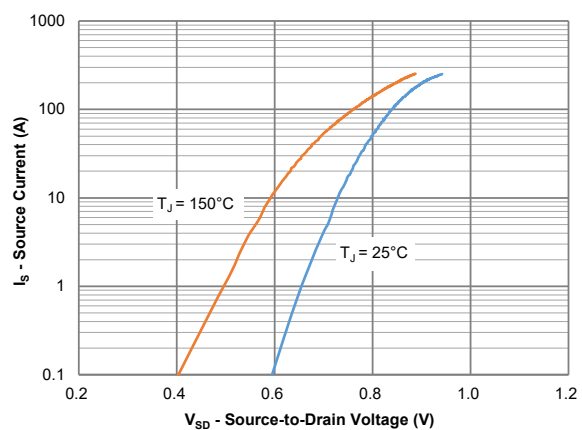


Figure 6: Source-Drain Diode Forward Voltage

Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

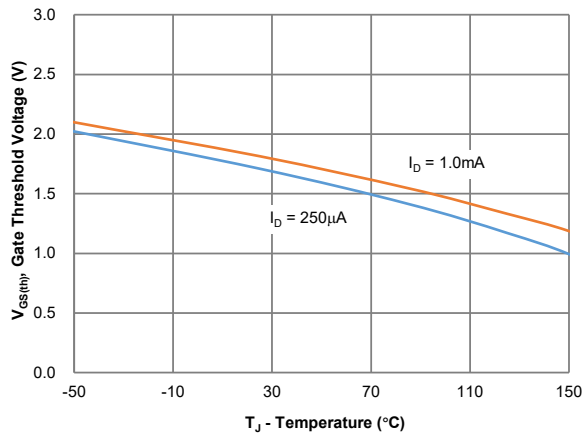


Figure 7: Gate Threshold Variation vs. Junction Temperature

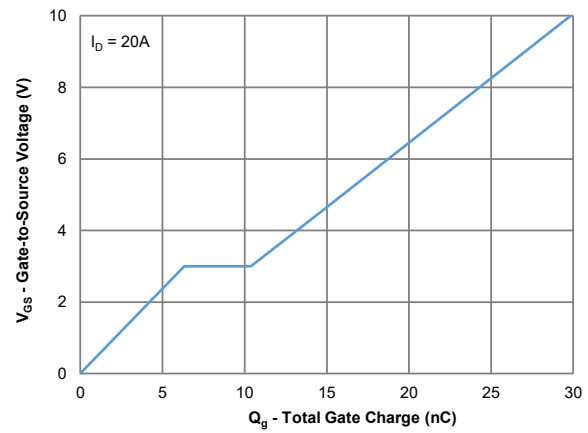


Figure 8: Gate Charge Characteristics

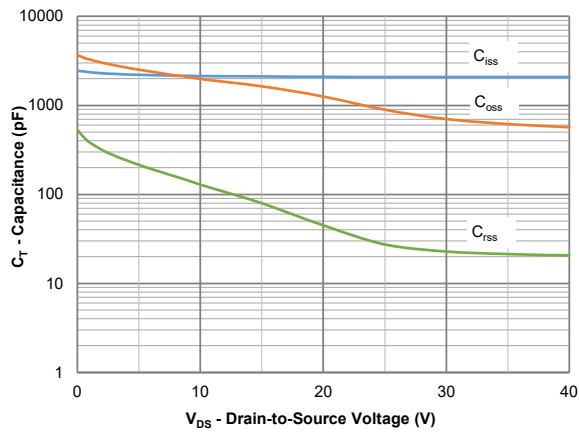


Figure 9: Capacitance Characteristics

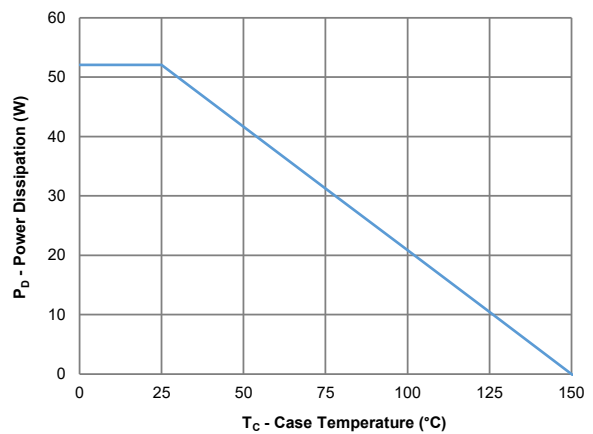


Figure 10: Power Derating

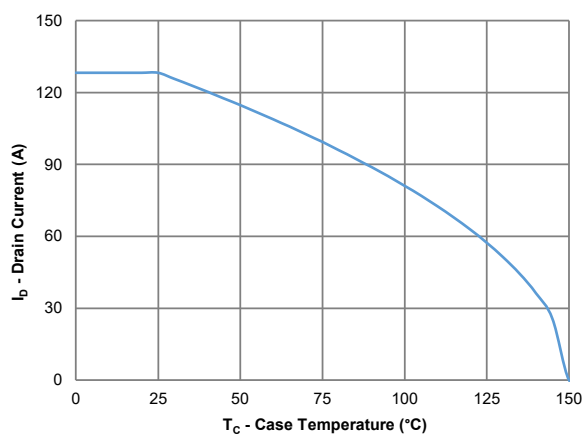


Figure 11: Current Derating

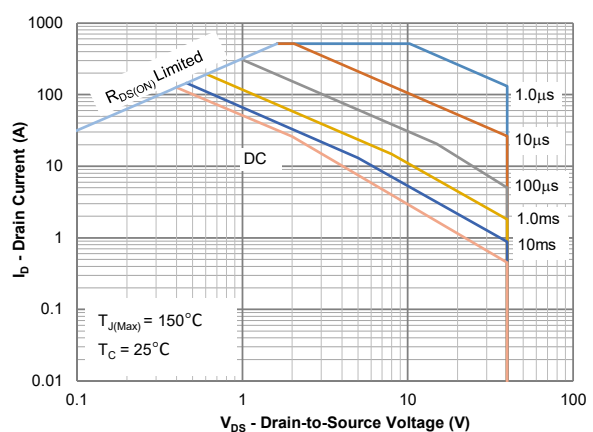


Figure 12: Safe Operating Area

Typical Characteristics Curves (T_J = 25°C unless otherwise noted)

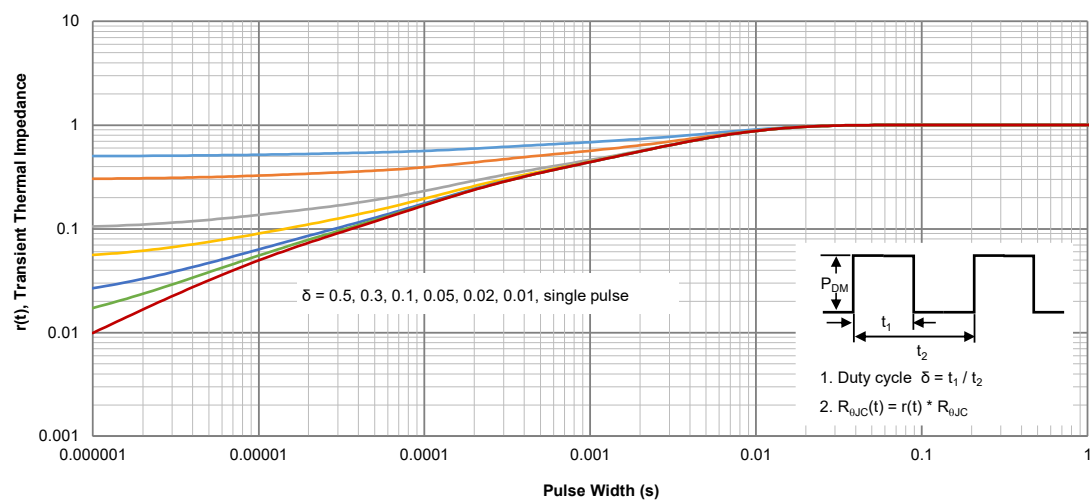
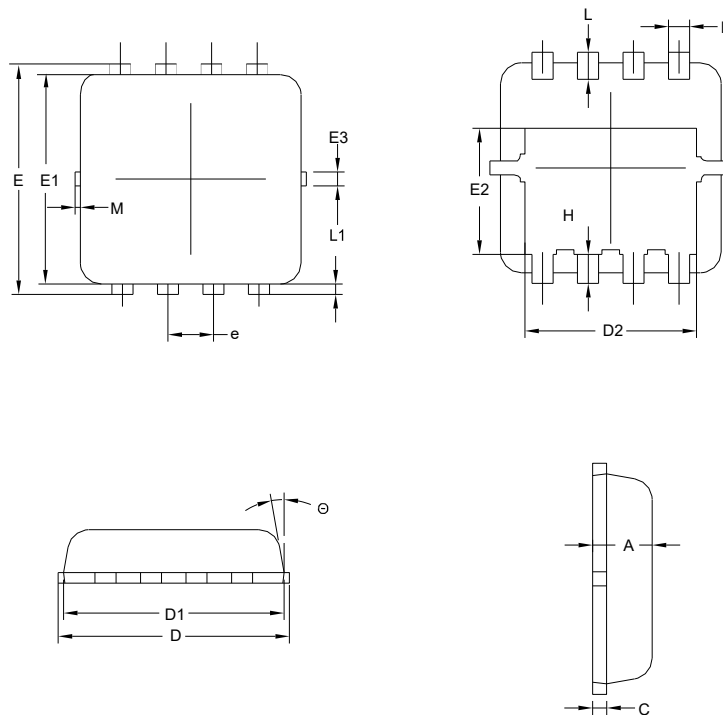


Figure 13: Normalized Maximum Transient Thermal Impedance

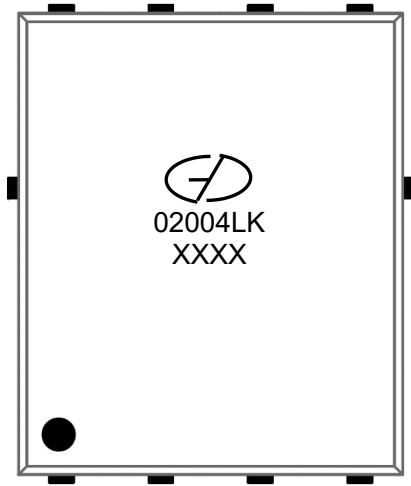
Package Outline Dimensions (Unit: millimeters)

PDFN3333



PDFN3333							
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	0.75	0.85	0.95	D1	3.0	3.15	3.25
b	0.2	0.3	0.4	D2	2.29	2.47	2.65
c	0.10	0.15	0.25	e	0.65BSC		
E	3.15	3.3	3.45	H	0.28	0.41	0.65
E1	2.9	3.05	3.2	L	0.3	0.4	0.5
E2	1.54	1.76	1.98	L1	-	0.13	-
E3	0.1	0.2	0.3	θ	0°	7°	14°
D	3.15	3.3	3.45	M	-	-	15°

Marking Outline



Part Name: GMN02004LK

1. Logo Mark: 
2. P/N Mark: 02004LK
3. Date Code: XXXX
4. Pin 1#: ●

Revision History

Version	Date	Major Changes
Rev.A	2025.11.17	Official Release

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