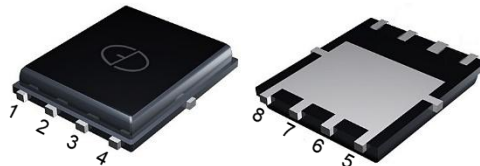


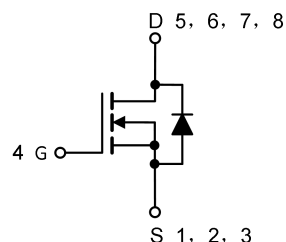
N-Channel 40V (D-S) Power MOSFET

Features

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



PDFN5060



Applications

- DC-DC
- Motors, lamps
- 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	$T_C=25^\circ\text{C}$ 170	A
		$T_C=100^\circ\text{C}$ 107	
Drain Current, Pulsed (Note 1)	I_{DM}	678	A
Single Avalanche Energy (Note 2)	E_{AS}	292	mJ
Power Dissipation	P_D	$T_C=25^\circ\text{C}$ 96	W
		$T_C=100^\circ\text{C}$ 38	
Operating Junction/ Storage Temperature Range	T_J / T_{STG}	-55 to +150	$^\circ\text{C}$

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

Note 2: $V_{DD} = 30\text{V}$, $V_{GS} = 10\text{V}$, $L = 1\text{mH}$, $R_G = 25\Omega$, starting $T_J = 25^\circ\text{C}$.

Thermal Characteristics

Parameter	Symbol	Max	Unit
Thermal Resistance Junction to Case	R_{thJC}	1.3	$^\circ\text{C/W}$
Thermal Resistance Junction to Ambient (Note 3)	R_{thJA}	45	$^\circ\text{C/W}$

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	--	--	1.0	uA
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =250uA	1.2	--	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	2.0	mΩ
		V _{GS} =4.5V, I _D =15A	--	2.4	3.0	mΩ
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	--	--	1.2	V
Reverse Recovery Time	T _{rr}	I _F = 20A, 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)

Fig.1 - Output Characteristics

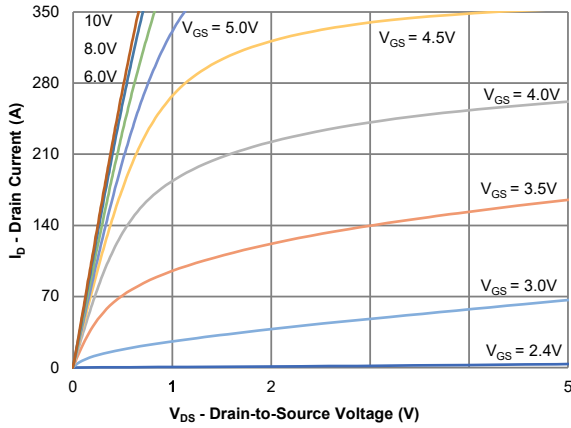


Fig.2 - Transfer Characteristics

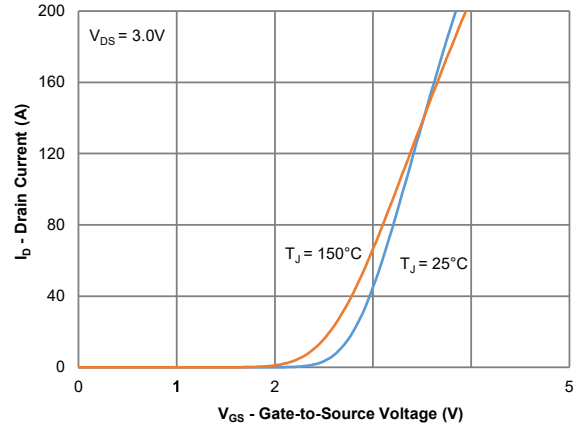


Fig.3 - On-Resistance vs. Gate-Source Voltage

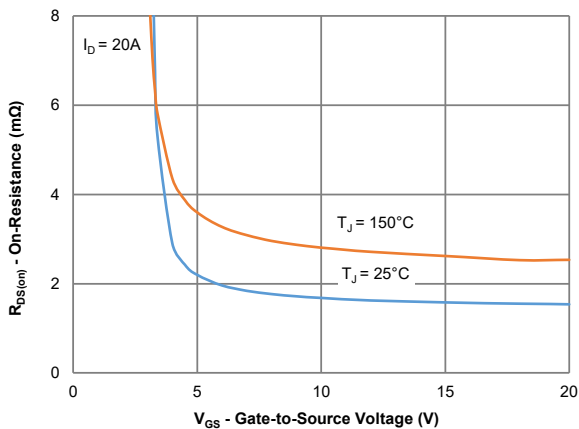


Fig.4 - On-Resistance vs. Drain Current and Gate Voltage

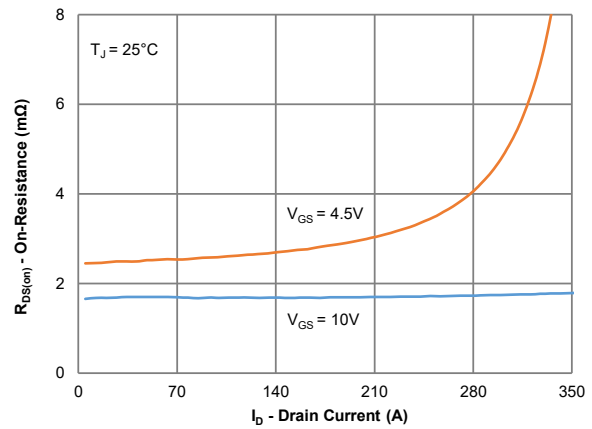


Fig.5 - On-Resistance vs. Junction Temperature

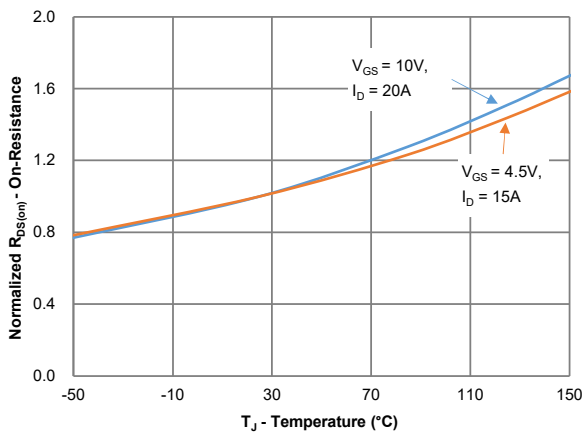
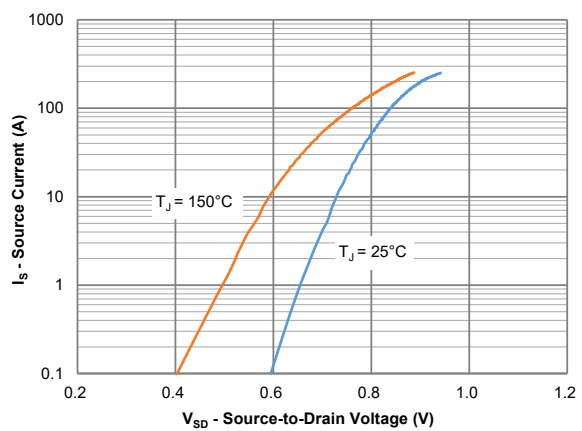


Fig.6 - Source-Drain Diode Forward Voltage



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

Fig.7 - Gate Threshold Variation vs. Junction Temperature

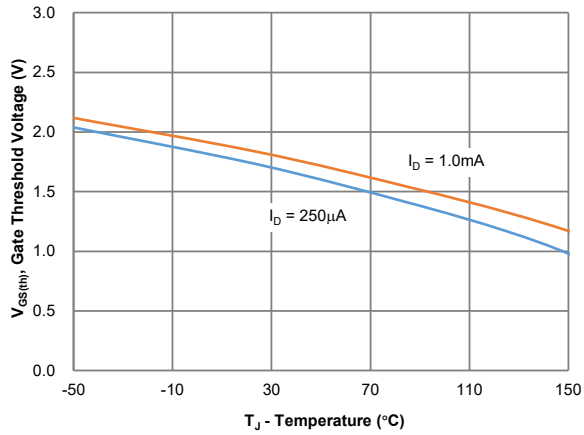


Fig.8 - Gate Charge Characteristics

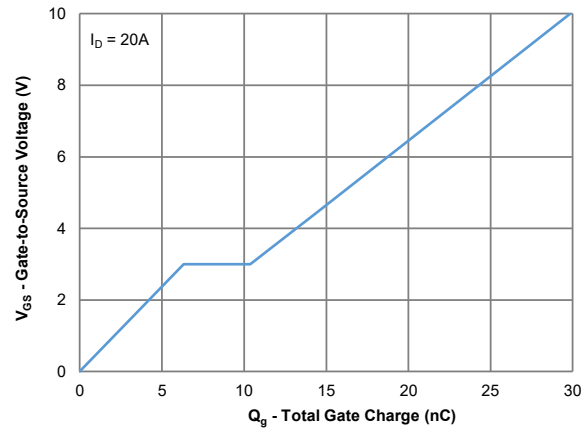


Fig.9 - Capacitance Characteristics

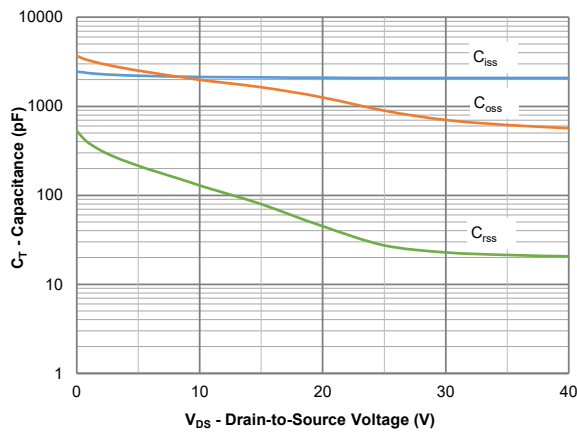


Fig.10 - Power Derating

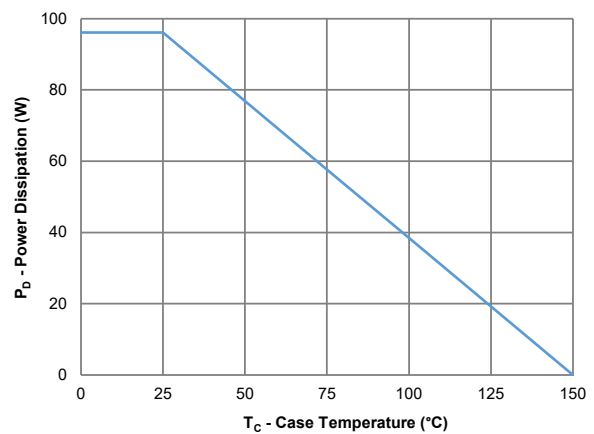


Fig.11 - Current Derating

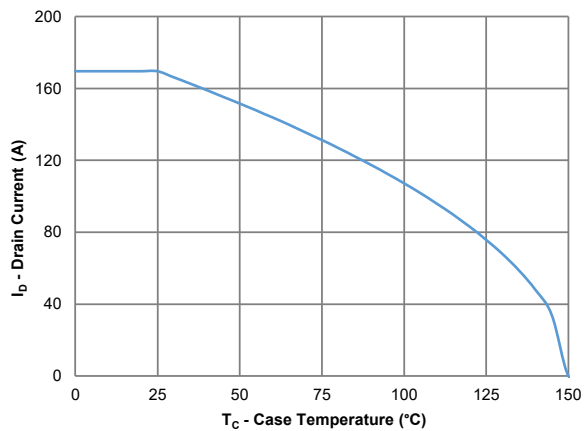
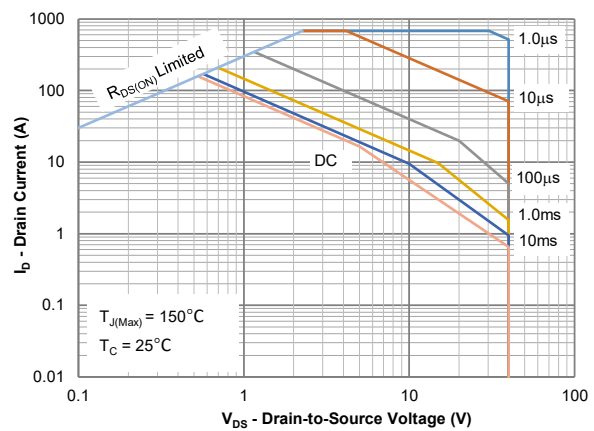
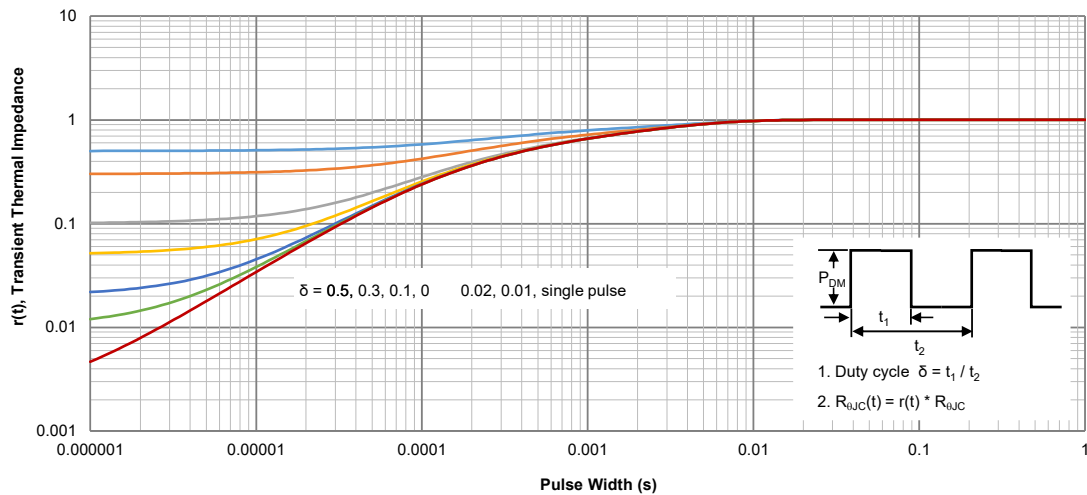


Fig.12 - Safe Operating Area



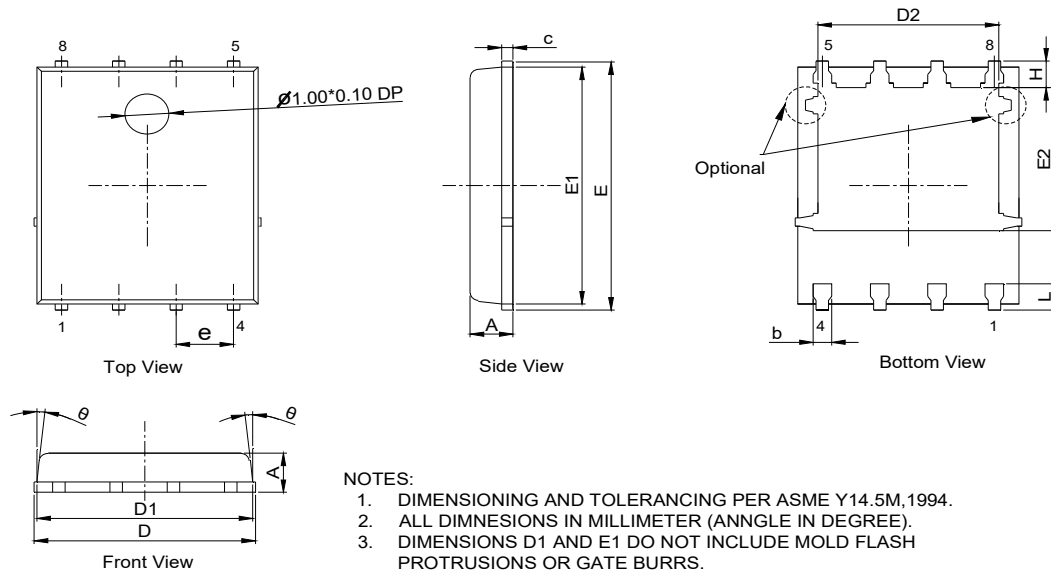
Typical Characteristics Curves (T_J = 25°C unless otherwise noted)

Fig.13 - Normalized Maximum Transient Thermal Impedance



Package Outline Dimensions

PDFN5060

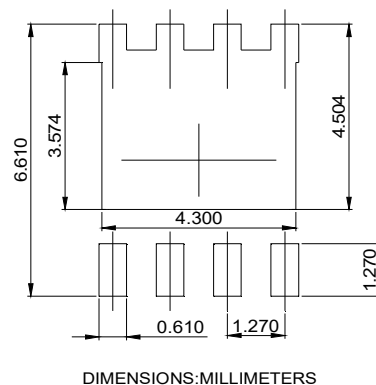


NOTES:

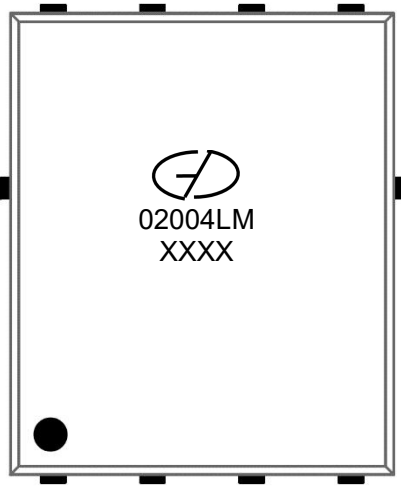
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. ALL DIMENSIONS IN MILLIMETER (ANGLE IN DEGREE).
3. DIMENSIONS $D1$ AND $E1$ DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.20	--	0.51
c	0.21	0.25	0.34
D	4.90	--	5.40
D1	4.80	--	5.15
D2	3.70	--	4.20
E	5.90	--	6.50
E1	5.65	5.80	5.95
E2	3.32	3.50	3.63
e	1.27BSC		
H	0.50	--	0.93
L	0.45	--	0.91
θ	0°	--	12°

Recommended Soldering Footprint



Marking Outline



Part Name: GMN02004LM

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

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