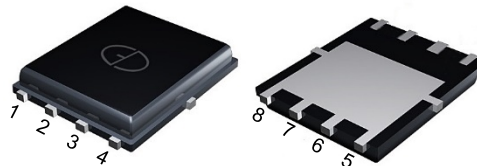


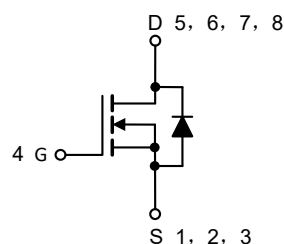
N-Channel 40V (D-S) Power MOSFET

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	$T_C=25^\circ\text{C}$ 85	A
		$T_C=100^\circ\text{C}$ 54	
Drain Current, Pulsed (Note 1)	I_{DM}	339	A
Single Avalanche Energy (Note 2)	E_{AS}	102	mJ
Power Dissipation	P_D	$T_C=25^\circ\text{C}$ 54	W
		$T_C=100^\circ\text{C}$ 22	
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: $V_{DD} = 20\text{V}$, $V_{GS} = 10\text{V}$, $L = 1\text{mH}$, starting $T_J = 25^\circ\text{C}$.

Thermal Characteristics

Parameter	Symbol	Max	Unit
Thermal Resistance Junction to Case	R_{thJC}	2.3	$^\circ\text{C/W}$
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	uA
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =250uA	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	--	3.7	4.5	mΩ
		V _{GS} =4.5V, I _D =15A	--	5.5	7.2	
Total Gate Charge	Q _g	V _{GS(off)} =0V, V _{GS(on)} =10V, V _{DD} =20V, I _D =20A	--	14.3	--	nC
Gate-Source Charge	Q _{gs}		--	3.1	--	
Gate-Drain Charge	Q _{gd}		--	1.8	--	
Turn-on Delay Time	t _{d(on)}	V _{GS} =10V, V _{DD} =20V, I _D =20A, R _G =3Ω	--	1.3	--	ns
Turn-on Rise Time	t _r		--	12	--	
Turn-off Delay Time	t _{d(off)}		--	17	--	
Turn-off Fall Time	t _f		--	12	--	
Gate Resistance	R _g	V _{GS} =0V, f=1MHz, open drain	--	4.1	--	Ω
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =20V, f=1MHz	--	994	--	pF
Output Capacitance	C _{oss}		--	602	--	
Reverse Transfer Capacitance	C _{rss}		--	23	--	

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	--	--	67	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	--	30	--	ns
Reverse Recovery Charge	Q _{rr}		--	11	--	nC

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

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

Fig1 - Output Characteristics

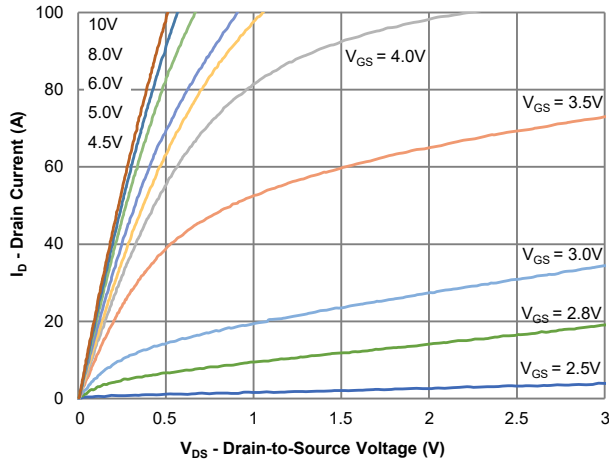


Fig2 - Transfer Characteristics

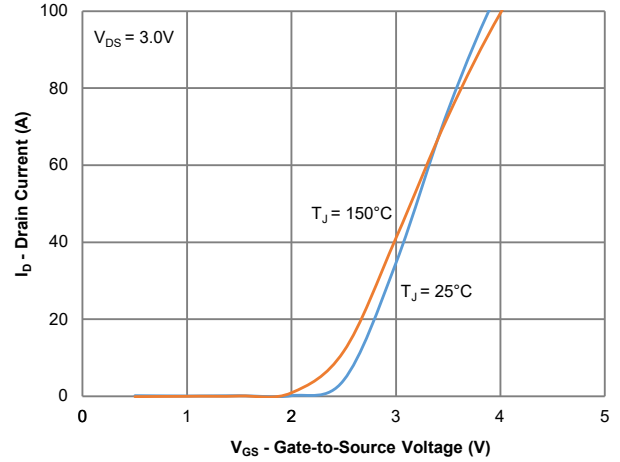


Fig3 - On-Resistance vs. Gate-Source Voltage

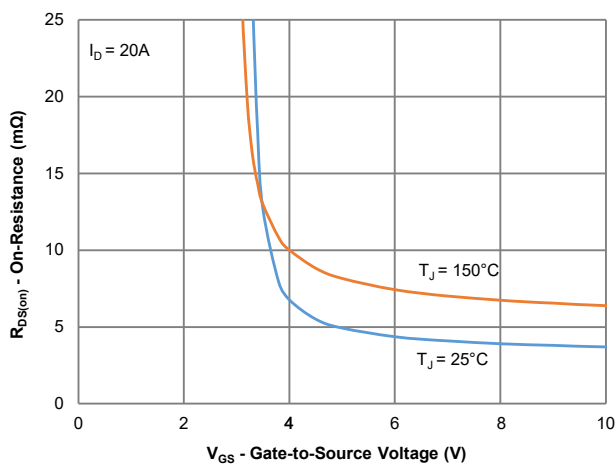


Fig4 - On-Resistance vs. Drain Current and Gate Voltage

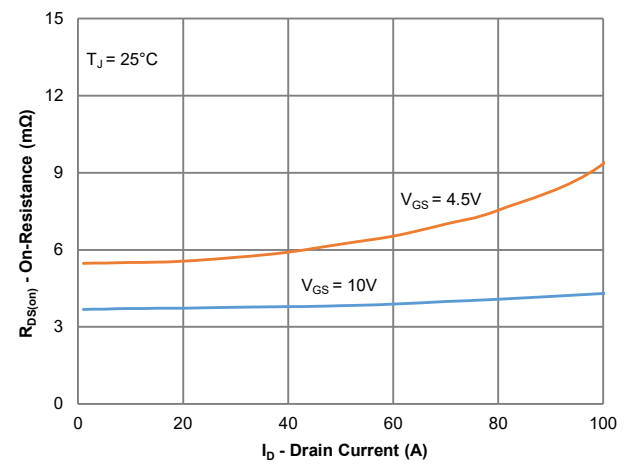


Figure 5: On-Resistance vs. Junction Temperature

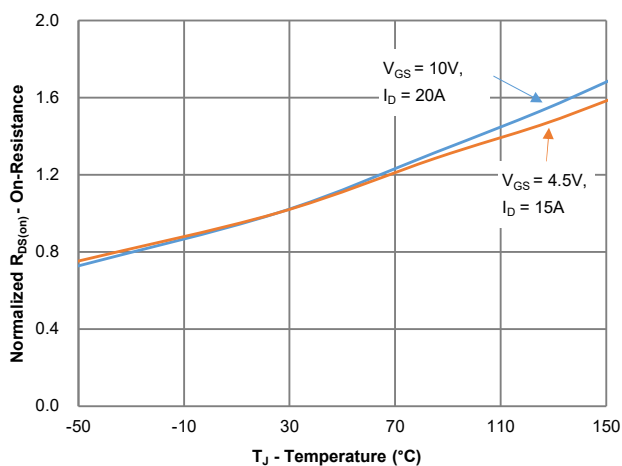
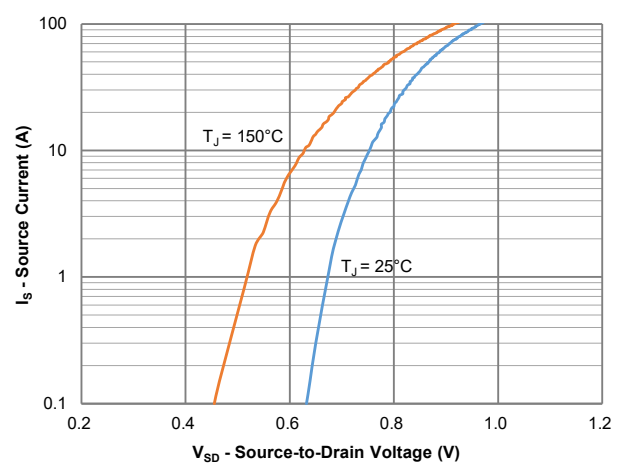


Fig6 - Source-Drain Diode Forward Voltage



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

Fig7 - Gate Threshold Variation vs. Junction Temperature

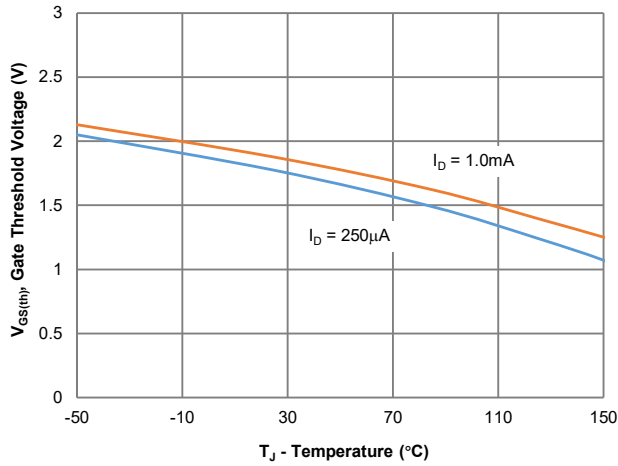


Fig8 - Gate Charge Characteristics

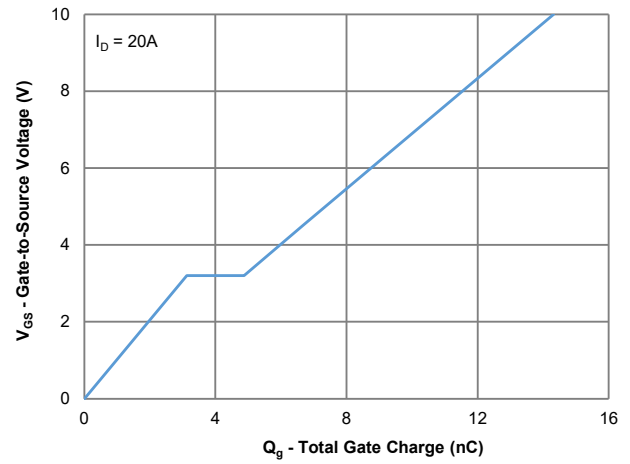


Fig9 - Capacitance Characteristics

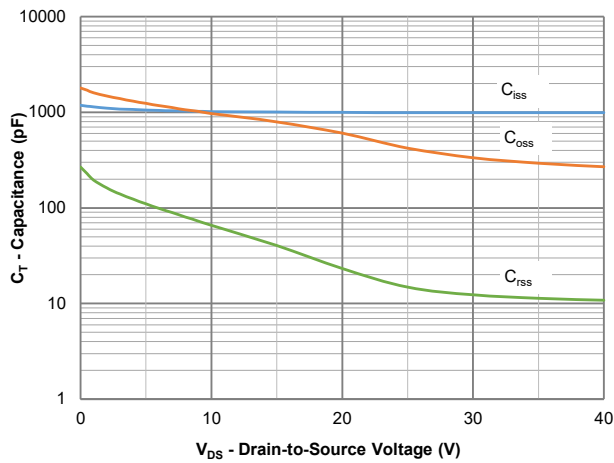


Fig10 - Power Derating

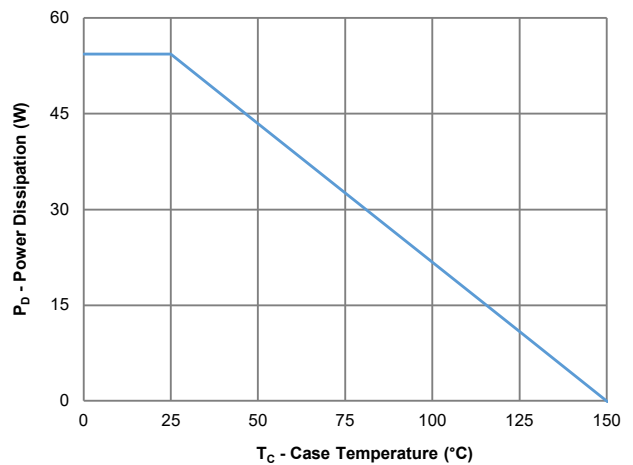


Fig11 - Current Derating

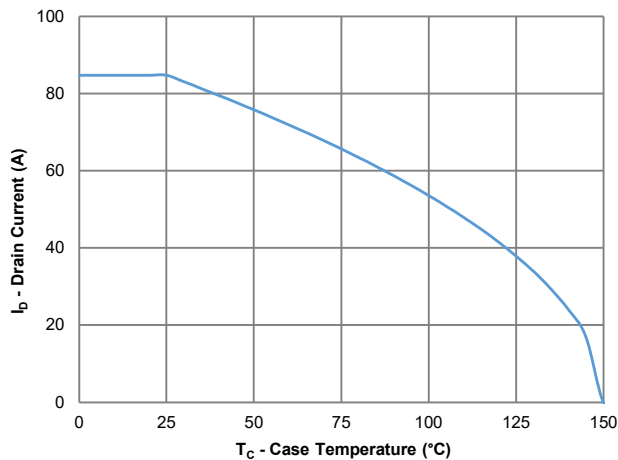
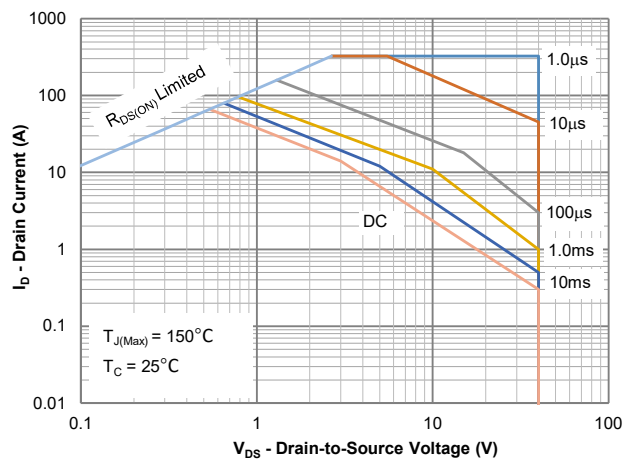
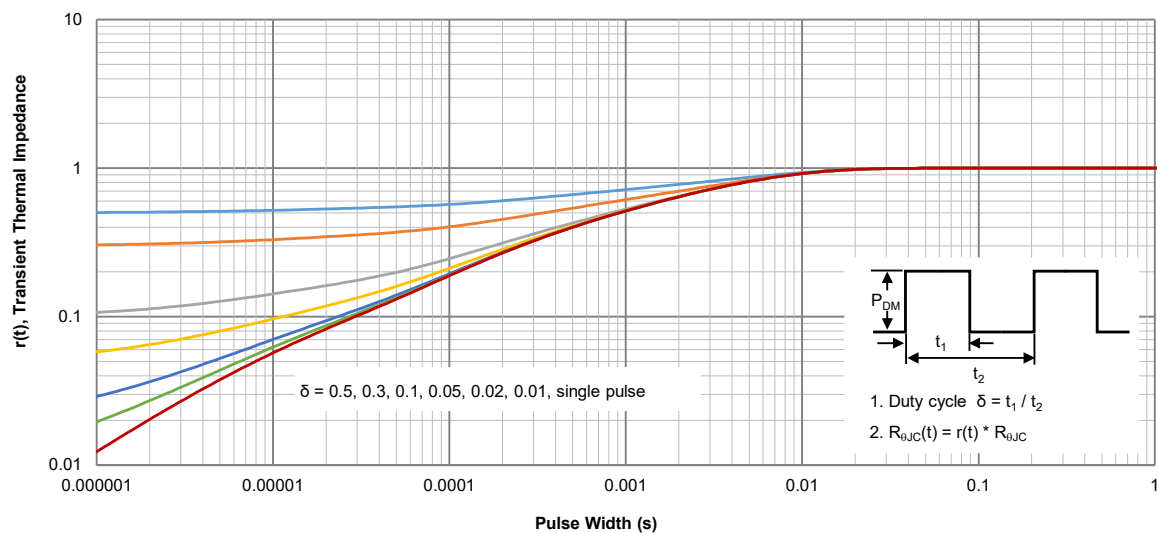


Fig12 - Safe Operating Area

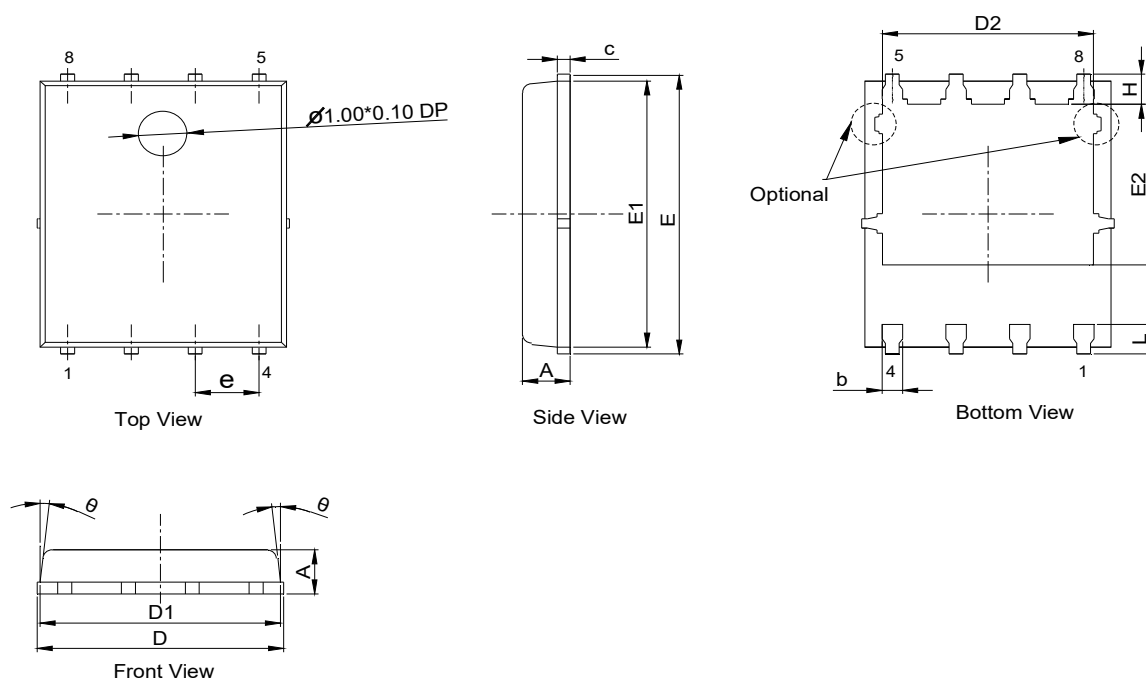


Typical Characteristics Curves (T_J = 25°C unless otherwise noted)

Fig13 - Normalized Maximum Transient Thermal Impedance



Package Outline Dimensions (Unit: millimeters)



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	1.05	1.20
b	0.20	0.41	0.51
c	0.20	0.25	0.35
D	4.80	--	5.40
D1	4.65	--	5.30
D2	3.60	--	4.30
E	5.90	--	6.30
E1	5.60	--	6.00
E2	3.37	--	3.92
e	1.27BSC		
H	0.40	0.60	0.75
L	0.40	0.60	0.84
θ	0°	--	12°

Marking Outline



Part Name: GMN04504LM

1. Logo Mark: 
2. P/N Mark: 04504LM
3. Date Code: XXXX
4. Pin 1#: ●

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