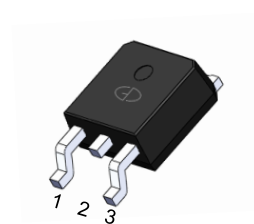


N-Channel 40V (D-S) Power MOSFET

Features

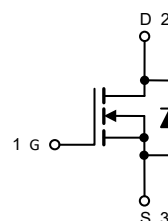
- 100% Avalanche Tested
- Extremely Low Losses with Low FOM $R_{DS(on)} \cdot Q_g$
- Halogen Free, Pb-Free
- RoHS Compliant



TO-252 (D-PAK)

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	$T_C=25^\circ\text{C}$ 146	A
		$T_C=100^\circ\text{C}$ 93	
Drain Current, Pulsed (Note 1)	I_{DM}	567	A
Single Avalanche Energy (Note 2)	E_{AS}	462	mJ
Power Dissipation	P_D	$T_C=25^\circ\text{C}$ 78	W
		$T_C=100^\circ\text{C}$ 31	
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}	1.6	$^\circ\text{C/W}$
Thermal Resistance Junction to Ambient (Note 3)	R_{thJA}	38	$^\circ\text{C/W}$

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	2	3	4	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	--	1.9	2.3	mΩ
Total Gate Charge	Q _g	V _{GS(off)} =0V, V _{GS(on)} =10V, V _{DD} =20V, I _D =20A	--	39	--	nC
Gate-Source Charge	Q _{gs}		--	11.8	--	
Gate-Drain Charge	Q _{gd}		--	7.8	--	
Turn-on Delay Time	t _{d(on)}	V _{GS} =10V, V _{DD} =20V, I _D =20A, R _G =3Ω	--	9.1	--	ns
Turn-on Rise Time	t _r		--	18	--	
Turn-off Delay Time	t _{d(off)}		--	25	--	
Turn-off Fall Time	t _f		--	13	--	
Gate Resistance	R _g	V _{GS} =0V, f=1MHz, open drain	--	1.4	--	Ω
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =20V, f=1MHz	--	2890	--	pF
Output Capacitance	C _{oss}		--	1682	--	
Reverse Transfer Capacitance	C _{rss}		--	77	--	

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	--	--	98	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	--	51	--	ns
Reverse Recovery Charge	Q _{rr}		--	56	--	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

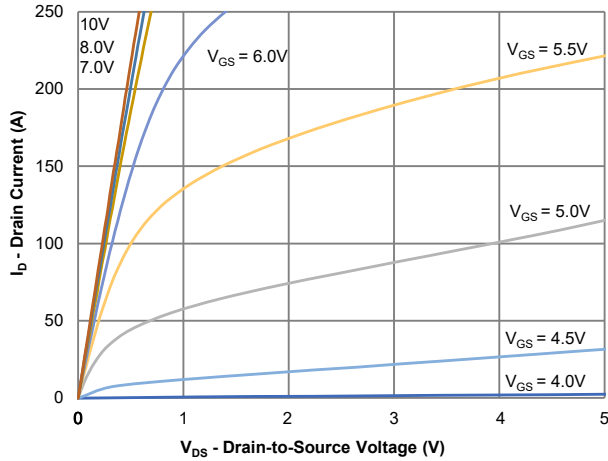


Fig2 - Transfer Characteristics

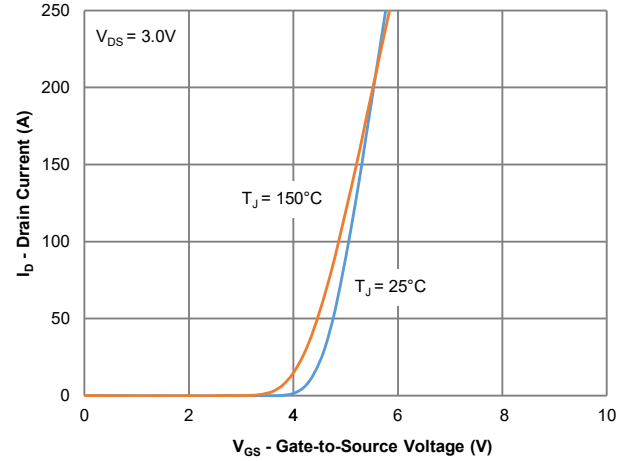


Fig3 - On-Resistance vs. Gate-Source Voltage

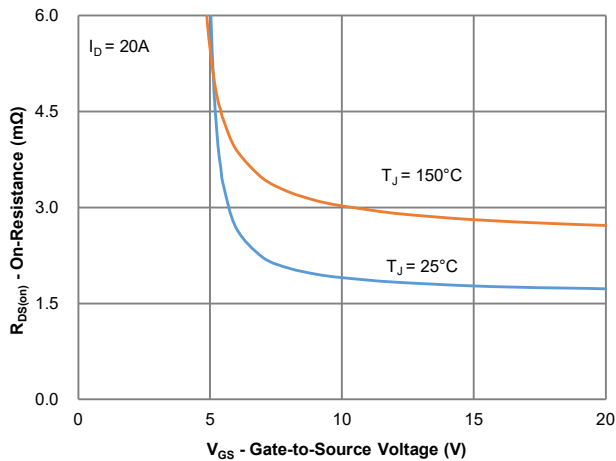


Fig4 - On-Resistance vs. Drain Current and Gate Voltage

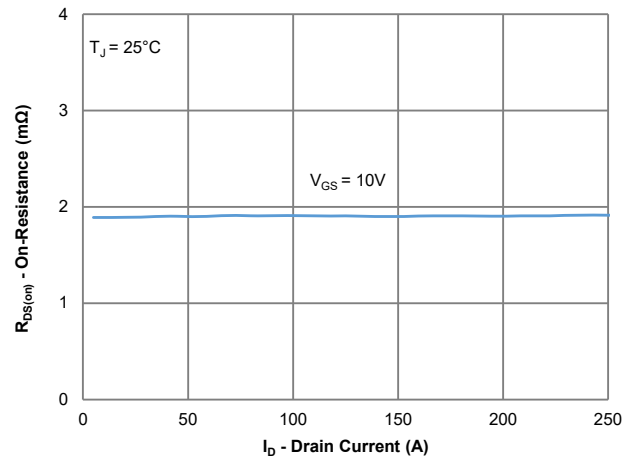


Fig5 - On-Resistance vs. Junction Temperature

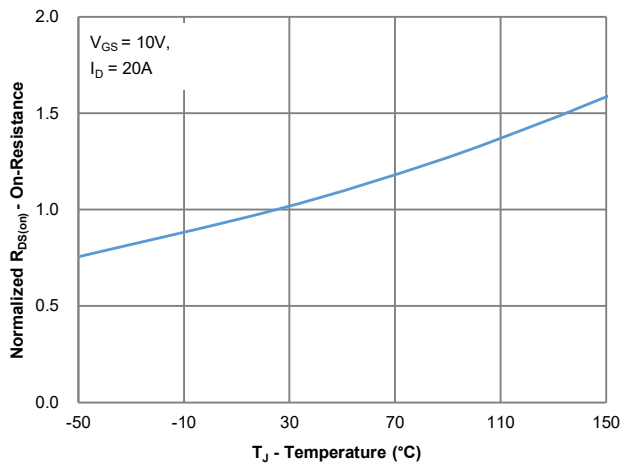
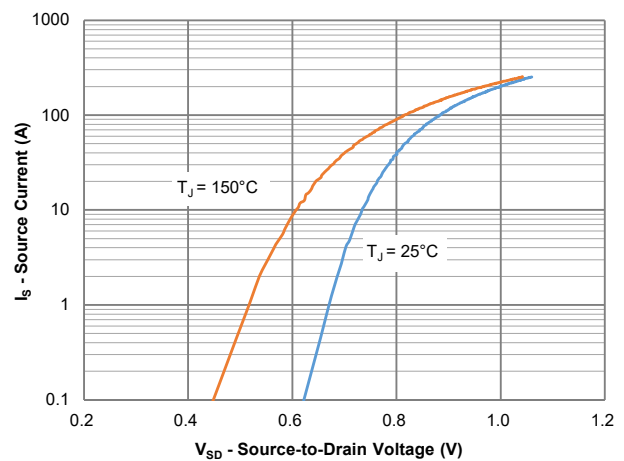


Fig6 - Source-Drain Diode Forward Voltage



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

Fig7 - Gate Threshold Variation vs. Junction Temperature

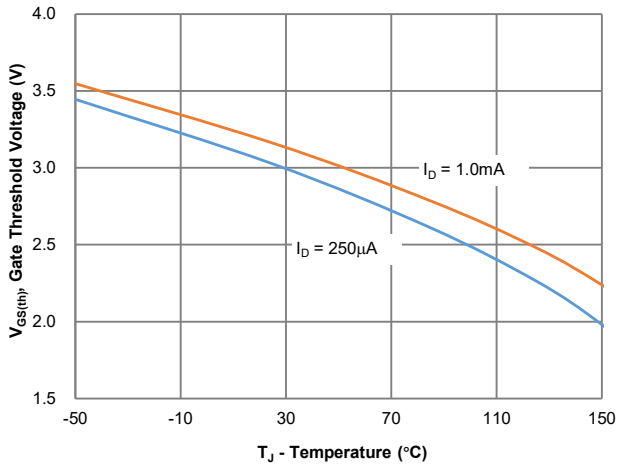


Fig8 - Gate Charge Characteristics

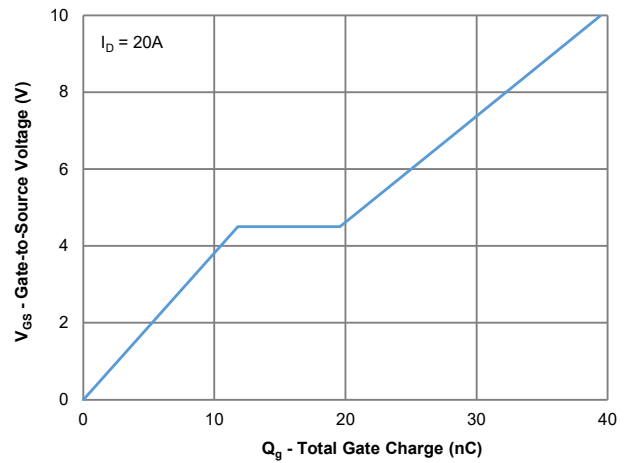


Fig9 - Capacitance Characteristics

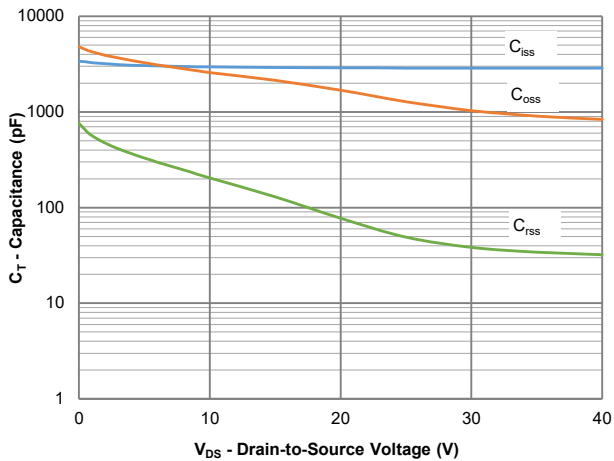


Fig10 - Power Derating

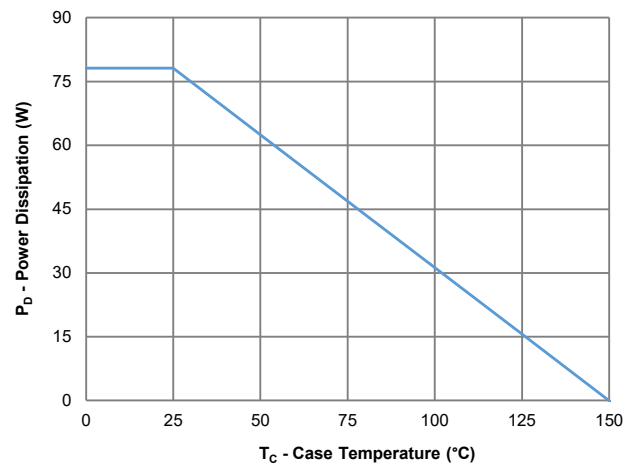


Fig11 - Safe Operating Area

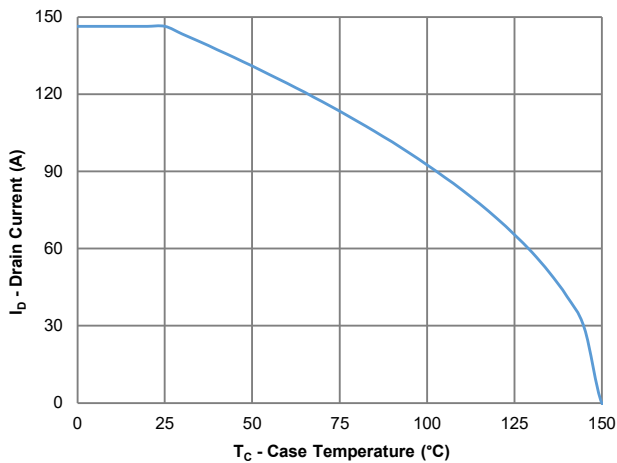
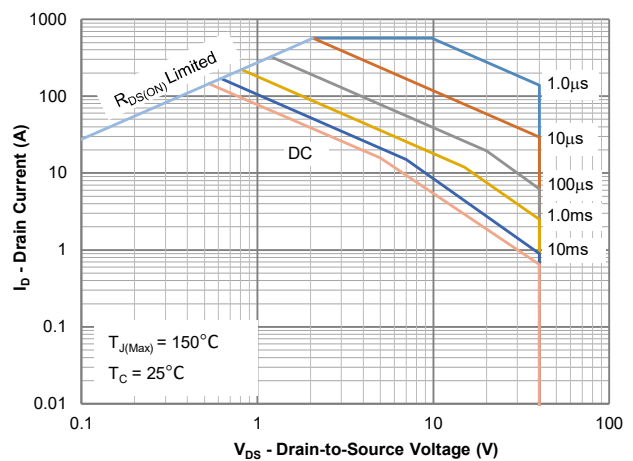


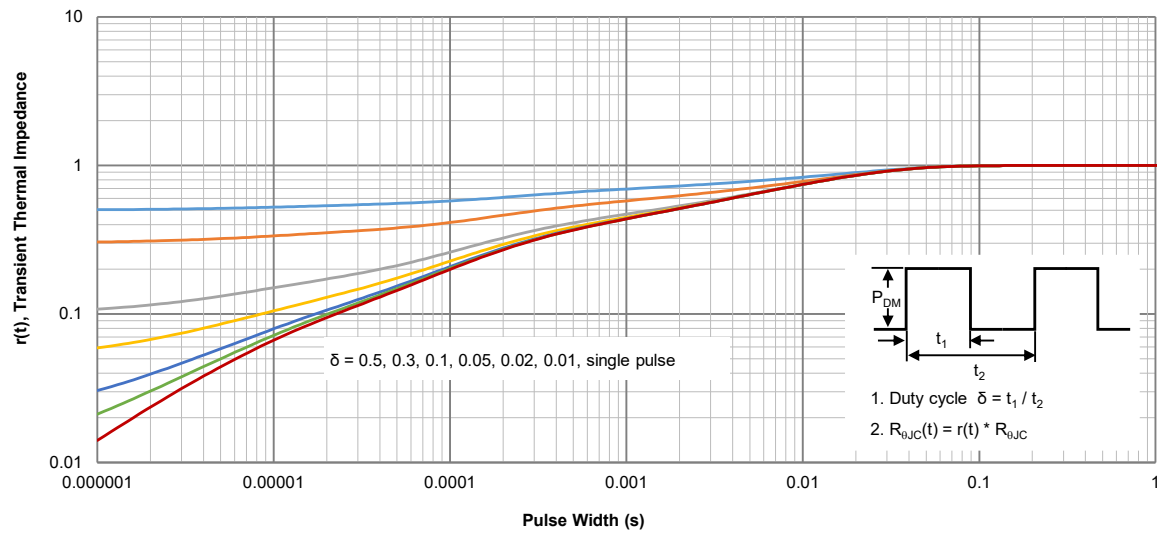
Figure 11: Current Derating

Fig12 - Safe Operating Area

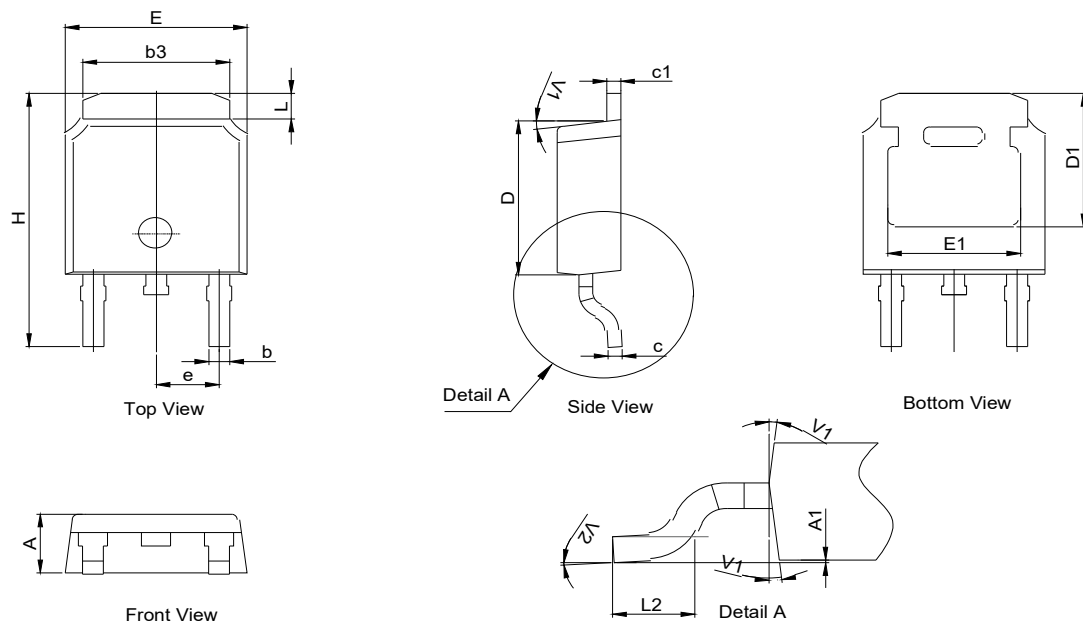


Typical Characteristics Curves (T_J = 25°C unless otherwise noted)

Fig13 - Normalized Maximum Transient Thermal Impedance

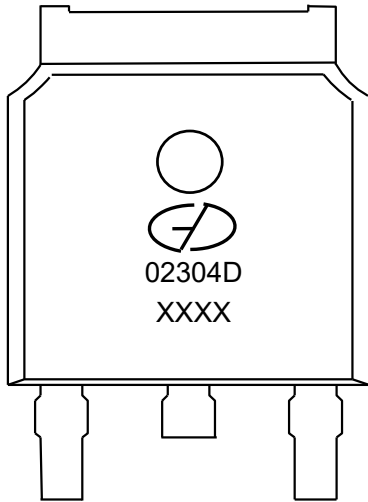


Package Outline Dimensions (Unit: millimeters)



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
A1	0	-	0.13
b	0.62	0.76	0.90
c	0.40	0.50	0.61
c1	0.46	0.50	0.58
D	5.97	6.10	6.23
D1	5.05	--	--
E	6.35	6.60	6.73
E1	4.32	--	--
b3	5.21	5.38	5.55
e	2.29 BSC		
H	9.40	10.00	10.40
L	0.89	--	1.27
L2	1.40	--	1.78
V1	7° REF		
V2	0°	-	6°

Marking Outline



Part Name: GMN02304D

1. Logo Mark: 
2. P/N Mark: 02304D
3. Date Code: XXXX

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