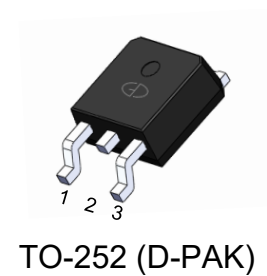


## N-Channel 40V (D-S) Power MOSFET

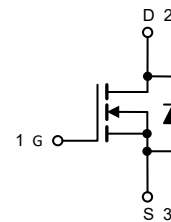
### Features

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



### 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	$V_{GS}$	$\pm 20$	V
Drain Current, Continuous $V_{GS}=10\text{V}$	$I_D$	$T_C=25^\circ\text{C}$	80
		$T_C=100^\circ\text{C}$	51
Drain Current, Pulsed (Note 1)	$I_{DM}$	320	A
Single Avalanche Energy (Note 2)	$E_{AS}$	256	mJ
Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	66
		$T_C=100^\circ\text{C}$	26
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:  $V_{DD} = 20\text{V}$ ,  $V_{GS} = 10\text{V}$ ,  $L = 0.5\text{mH}$ ,  $R_G = 25\Omega$ , starting  $T_J = 25^\circ\text{C}$ .

Thermal Characteristics			
Parameter	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{thJC}$	1.9	$^\circ\text{C/W}$
Thermal Resistance Junction to Ambient (Note 3)	$R_{thJA}$	62.5	$^\circ\text{C/W}$

Note 3: Device mounted on 1 square inch FR4 PCB board, with 2oz single-sided copper, in a  $25^\circ\text{C}$  still air environment.

<b>Electrical Characteristics</b> ( $T_J = 25^\circ\text{C}$ unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	40	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=40V, V_{GS}=0V$	--	--	1	$\mu A$
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1	--	2.5	V
Gate Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	$\pm 100$	nA
Drain-Source On-state Resistance (Note 4)	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	--	4.5	6	m $\Omega$
		$V_{GS}=4.5V, I_D=20A$	--	8	10.6	
Total Gate Charge	$Q_g$	$V_{GS(off)}=0V, V_{GS(on)}=10V, V_{DD}=20V, I_D=20A$	--	55	--	nC
Gate-Source Charge	$Q_{gs}$		--	8.7	--	
Gate-Drain Charge	$Q_{gd}$		--	13.5	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{GS}=10V, V_{DD}=20V, R_L=1\Omega, R_G=3\Omega$	--	14	--	ns
Turn-on Rise Time	$t_r$		--	8	--	
Turn-off Delay Time	$t_{d(off)}$		--	44	--	
Turn-off Fall Time	$t_f$		--	15	--	
Gate Resistance	$R_g$	$V_{GS}=0V, f=1MHz, \text{open drain}$	--	0.67	--	$\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=20V, f=1MHz$	--	3000	--	pF
Output Capacitance	$C_{oss}$		--	250	--	
Reverse Transfer Capacitance	$C_{rss}$		--	170	--	

<b>Reverse Diode Characteristics</b> ( $T_J = 25^\circ\text{C}$ unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Current, Continuous	$I_{SD}$	$T_C=25^\circ\text{C}$	--	--	84	A
Diode Forward Voltage (Note 4)	$V_{SD}$	$I_F=20A, V_{GS}=0V$	--	--	1.2	V
Reverse Recovery Time	$T_{rr}$	$I_F=20A, di/dt=500A/\mu s$	--	44	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	49	--	nC

Note 4: Pulse test; pulse width  $\leq 380\mu s$ , duty cycle  $\leq 1\%$ .

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

Fig.1 - Output Characteristics

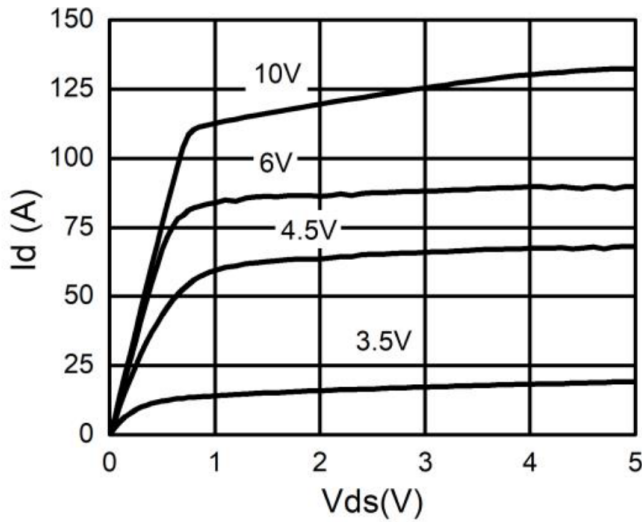


Fig.2 - Transfer Characteristics

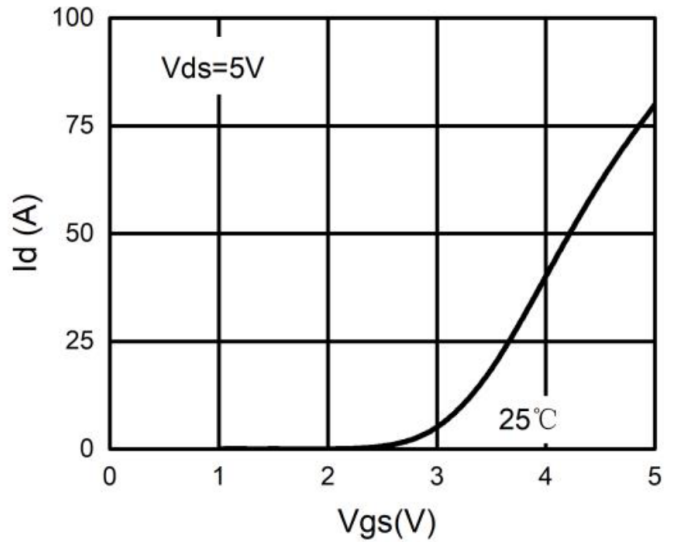


Fig.3 - Normalized On-Resistance

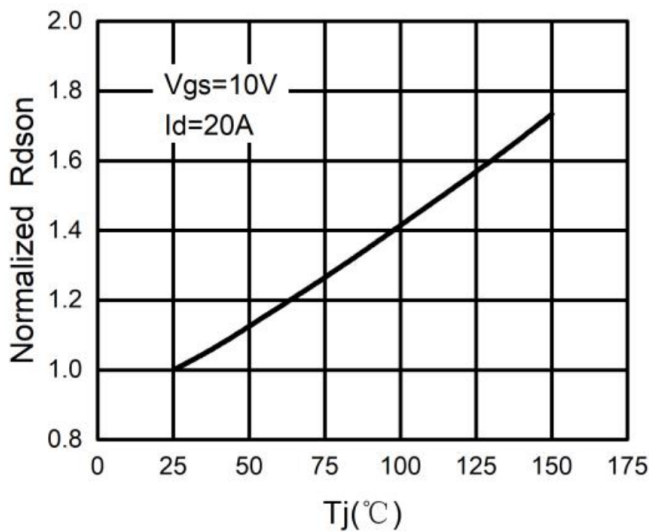


Fig.4 - Capacitance

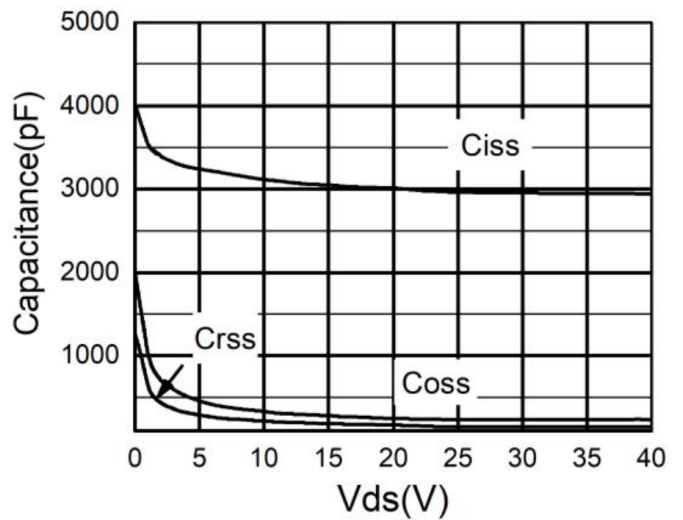


Fig.5 - Gate charge

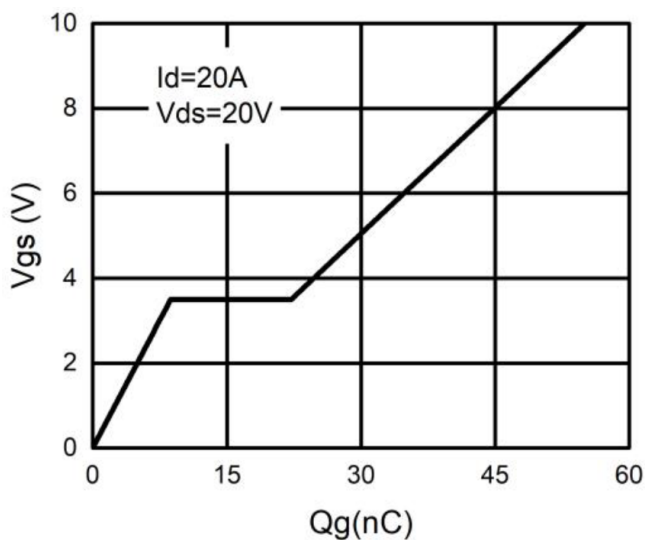
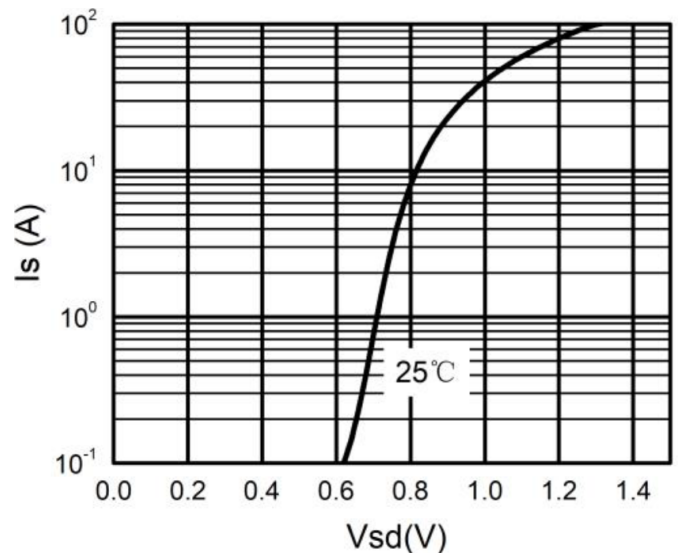


Fig.6 - Forward Characteristic



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

Fig.7 - Safe Operating Area

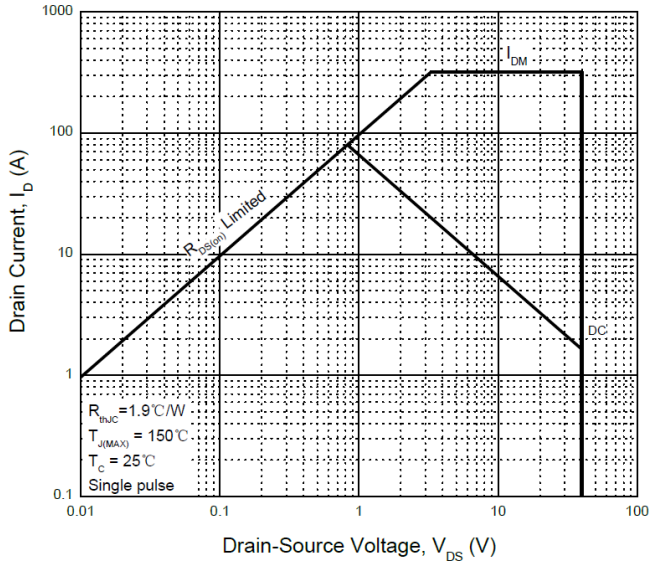


Fig.8 - Power Derating

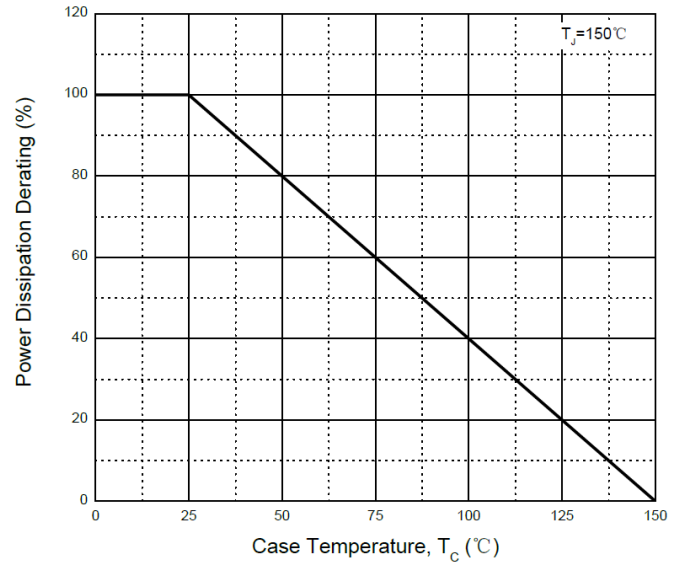
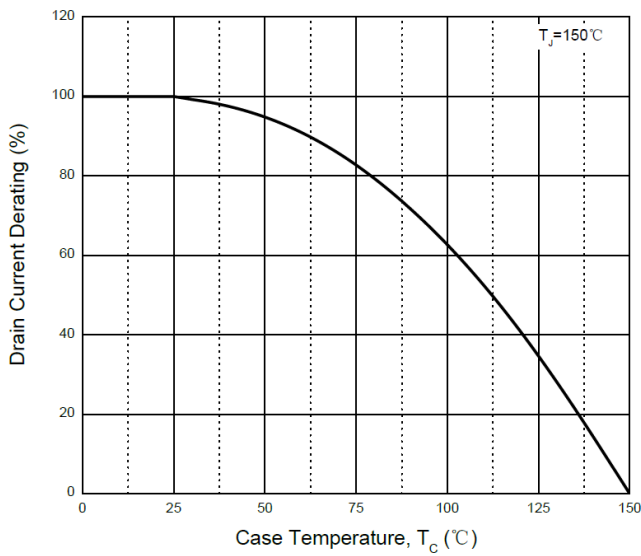
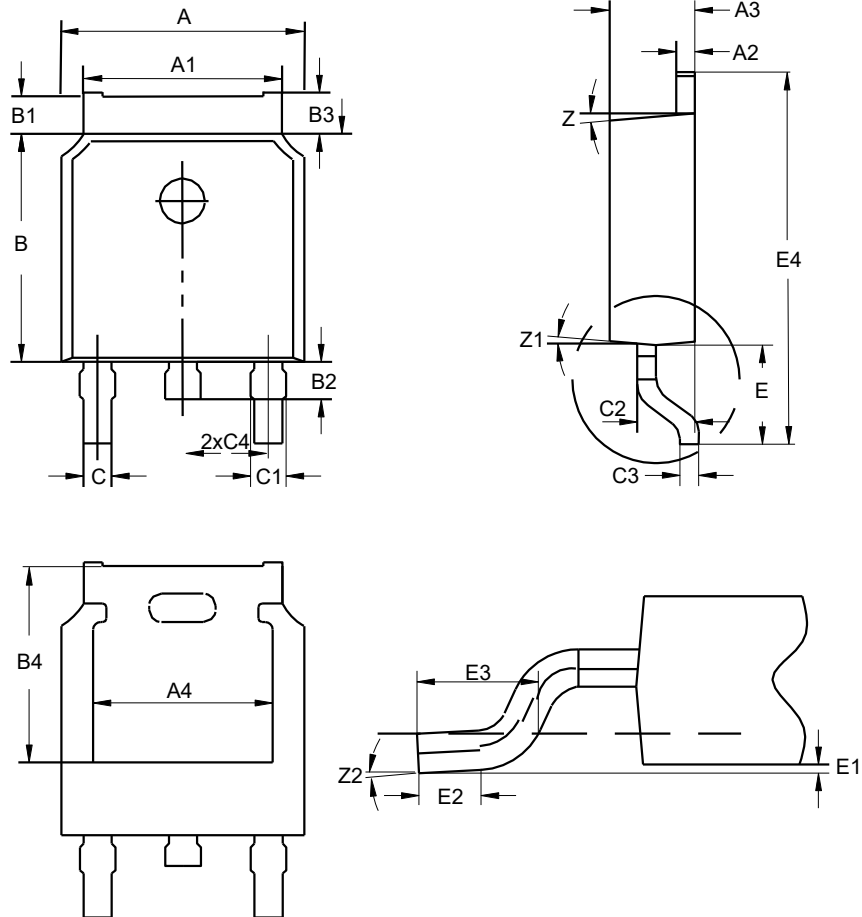


Fig.9 - Drain Current Derating



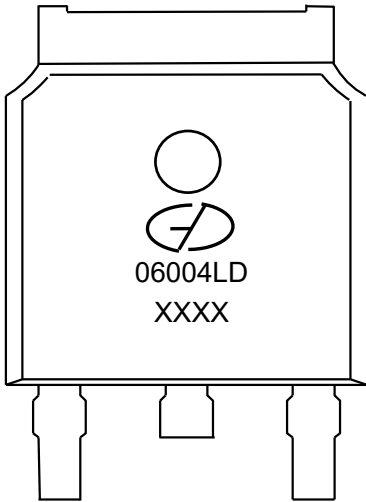
**Package Outline Dimensions** (Unit: millimeters)

**TO-252(D-PAK)**




TO-252							
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	6.34	6.54	6.74	C2	1.34	1.54	1.74
A1	5.2	5.3	5.4	C3	0.4	0.5	0.6
A2	0.4	0.5	0.6	C4	2.09	2.29	2.49
A3	2.08	2.28	2.48	E	2.6	2.9	3.2
A4	4.6	4.8	5.0	E1	0	-	0.15
B	5.8	6.1	6.4	E2	0.7	-	-
B1	0.82	1.02	1.22	E3	1.3	1.6	1.9
B2	0.8	1	1.2	E4	9.8	10.1	10.4
B3	0.9	1.1	1.3	Z	-	7°	-
B4	5.05	5.25	5.45	Z1	-	7°	-
C	0.66	0.76	0.86	Z2	0°	-	10°
C1	0.65	0.85	1.05	-	-	-	-

**Marking Outline**



Part Name: GMN06004LD

1. Logo Mark: 
2. P/N Mark: 06004LD
3. Date Code: XXXX

**Revision History**

Version	Date	Major Changes
Rev.A	2024.07.30	Official Release

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