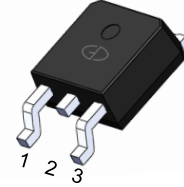


650mΩ,650V (D-S) Super Junction Power MOSFET

Features

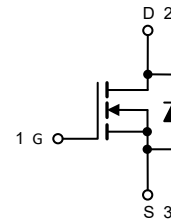
- 100% Avalanche Tested
- Extremely Low Losses with Low FOM $R_{ds(on)} \cdot Q_g$
- Halogen Free, Pb-Free
- RoHS Compliant



TO-252 (D-PAK)

Applications

- Solar inverter
- Telecom/Sever
- AC/DC power supply



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate Source Voltage	V_{GS}	± 30	V
Drain Current, Continuous $V_{GS}=10\text{V}$	I_D	$T_C=25^\circ\text{C}$	8
		$T_C=100^\circ\text{C}$	4.5
Drain Current, Pulsed (Note 1)	I_{DM}	14	A
Single Avalanche Energy (Note 2)	E_{AS}	156	mJ
Power Dissipation	P_D	$T_C=25^\circ\text{C}$	62.5
		$T_C=100^\circ\text{C}$	25
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 ~ +150	$^\circ\text{C}$

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

Note 2: $V_{DD} = 50\text{V}$, $I_D = 2.5\text{A}$, $V_{GS} = 10\text{V}$, $L = 0.5\text{mH}$, $R_G = 25\Omega$, starting $T_J = 25^\circ\text{C}$.

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	2	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Ambient (Note 3)	$R_{\theta JA}$	62	$^\circ\text{C/W}$

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	650	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V	--	--	1	uA
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =250uA	2.0	--	4.0	V
Gate Leakage Current	I _{GSS}	V _{GS} =±10V, V _{DS} =0V	--	--	±100	nA
Drain-Source On-state Resistance (Note 4)	R _{DS(on)}	V _{GS} =10V, I _D =20A	--	0.56	0.65	Ω
Total Gate Charge	Q _g	V _{GS(off)} =0V, V _{GS(on)} =10V, V _{DD} =480V, I _D =3.2A	--	12	--	nC
Gate- Source Charge	Q _{gs}		--	1.6	--	
Gate- Drain Charge	Q _{gd}		--	5	--	
Turn-on Delay Time	t _{d(on)}	V _{GS} =13V, V _{DD} =400V, I _D =3.2	--	5.3	--	ns
Turn-on Rise Time	t _r		--	20.5	--	
Turn-off Delay Time	t _{d(off)}		--	23	--	
Turn-off Fall Time	t _f		--	24	--	
Gate Resistance	R _g	V _{GS} =0V, f=1MHz, open drain	--	2.3	--	Ω
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =50V, f=1MHz	--	430	--	pF
Output Capacitance	C _{oss}		--	25	--	
Reverse Transfer Capacitance	C _{rss}		--	1.8	--	

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	--	--	8	A
Diode Forward Voltage (Note 4)	V _{SD}	I _F =3.2A, V _{GS} =0V	--	--	1.2	V
Reverse Recovery Time	T _{rr}	V _R =400V, I _F =3.2A, di/dt = 100 A/μs	--	171	--	ns
Reverse Recovery Charge	Q _{rr}		--	1.12	--	uC

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

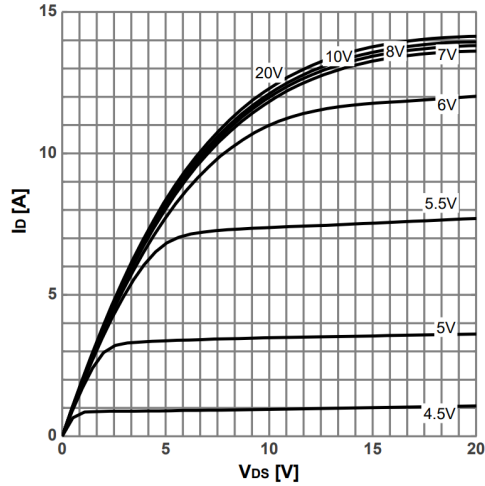


Fig.2 - Transfer Characteristics

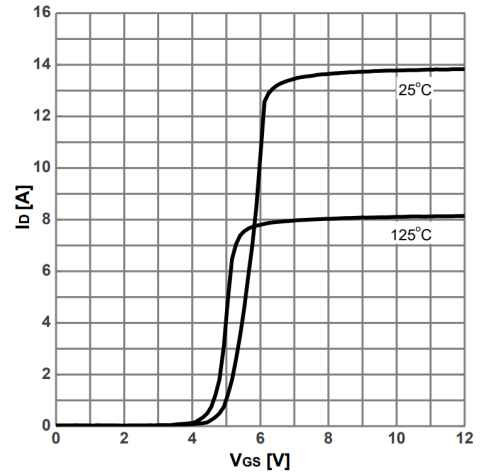


Fig.3 - Drain-Source On-Resistance

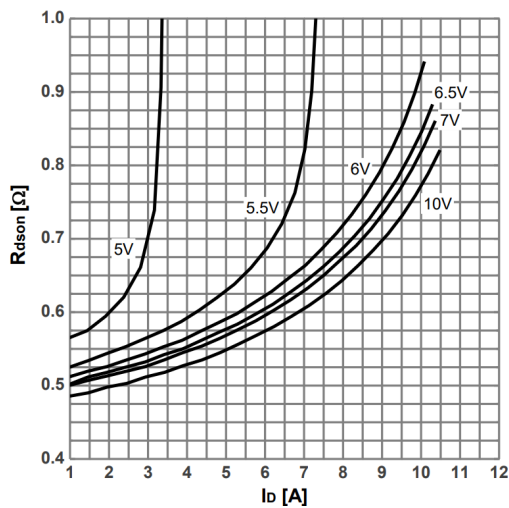


Fig.4 - Normalized On-Resistance

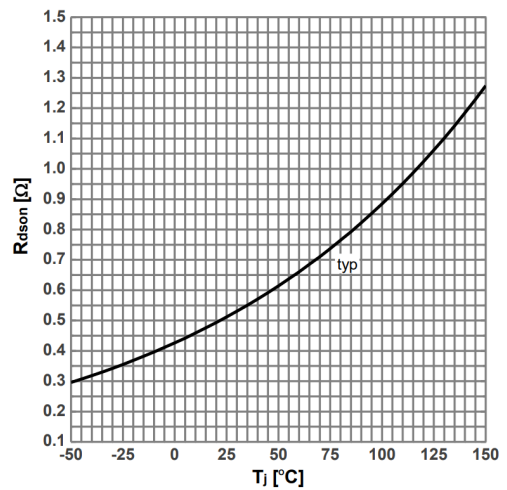


Fig.5 - Capacitance

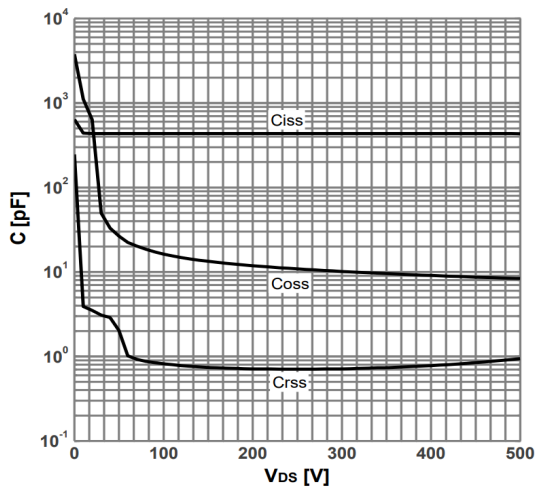
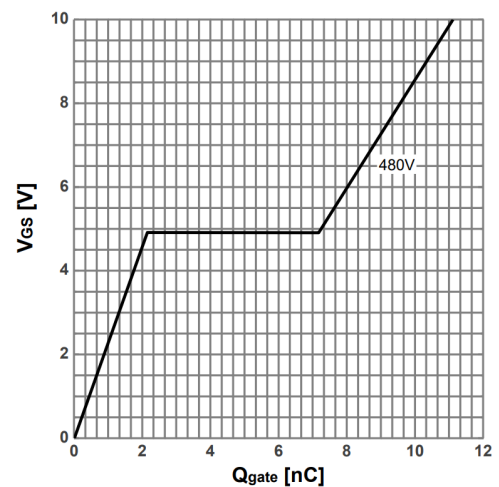


Fig.6 - Gate charge



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

Fig.7 - Forward Characteristic

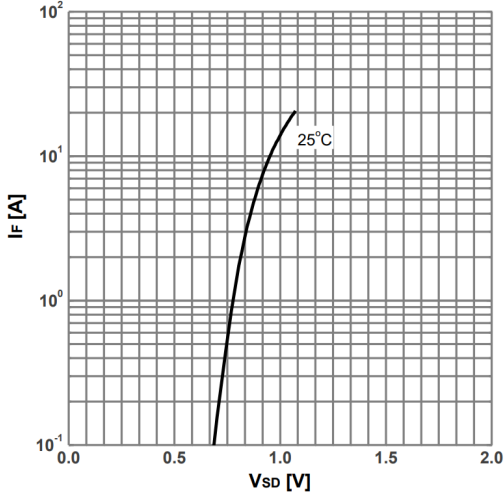


Fig.8 - Safe Operating Area

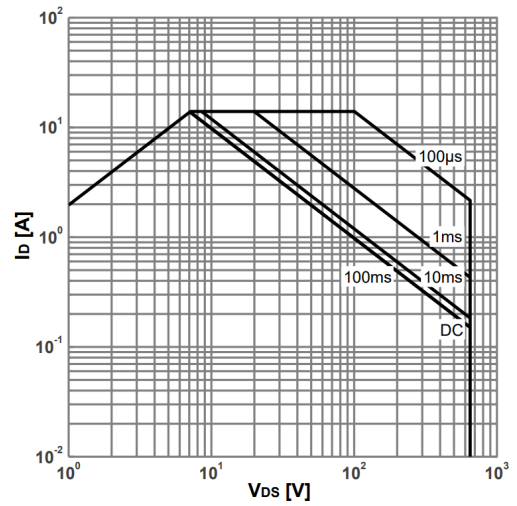


Fig.9 - Forward Characteristic

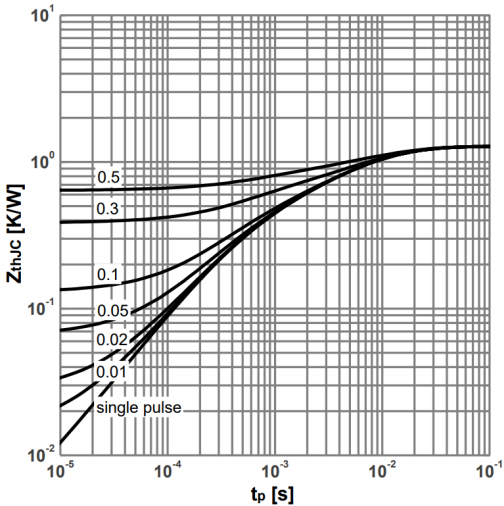


Fig.10 - Power Derating

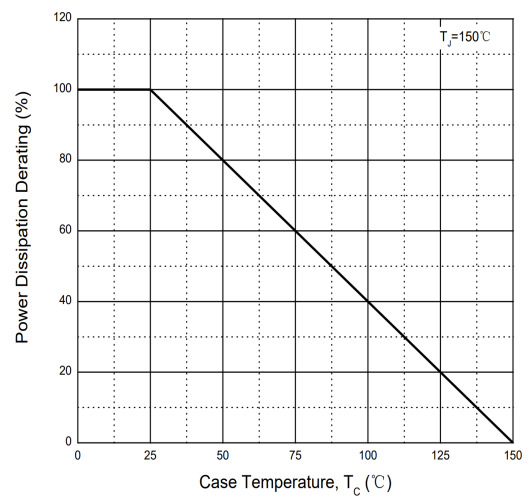
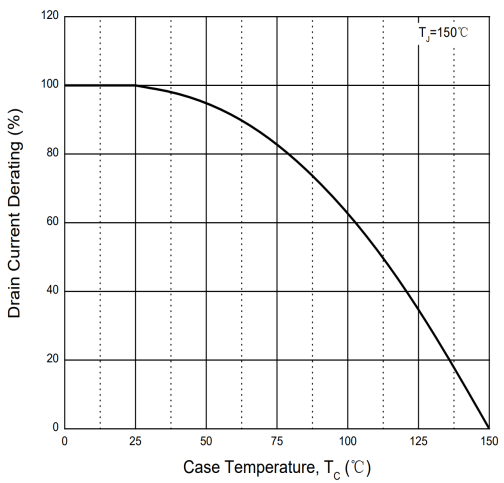
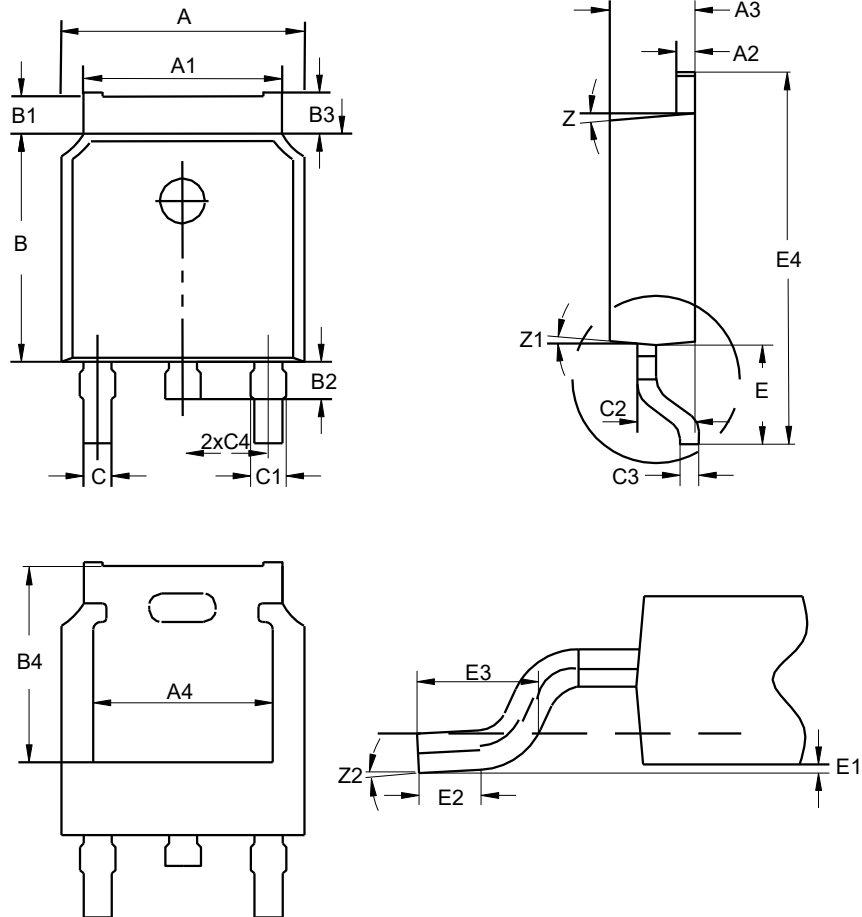


Fig.11 - Drain Current Derating



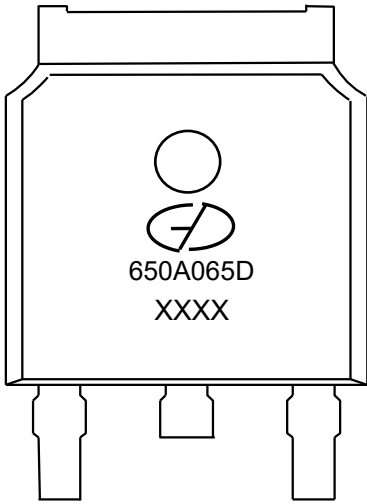
Package Outline Dimensions (Unit: millimeters)


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: GMN650A065D	
1.	Logo Mark: 
2.	P/N Mark: 650A065D
3.	Date Code: XXXX

Revision History

Version	Date	Major Changes
Rev.A	2024.06.17	Official Release

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