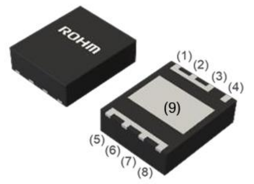
GNE1040TB

GaN Enhancement Mode Power Transistor **Datasheet**

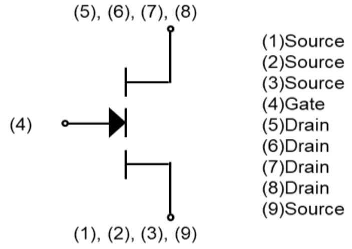
V_{DSS}	150V
$R_{DS(on)}$ (Typ.)	40mΩ
$Q_{G,\ typ.}$	2nC
$I_{D(Tc=25°C)}$ *2	10A
Q_{OSS}@50V	13nC
Qrr	0nC

●Outline

DFN5060



●Inner circuit



●Features

- 150V E-mode GaN FET
- High Gate Voltage Maximum Rating
- Reliable and easy to use with DFN package

●Application

- Half Bridge topologies
- AC/DC Converters (secondary side)
- Class D Audio amplifiers
- IR LED, LD driver

●Absolute maximum ratings (T_a = 25°C)

Parameter		Symbol	Value	Unit
Continuous Drain current	T_a = 25°C	I_D *1	6.6	A
	T_c = 25°C	I_D *2	10.0	A
Pulse Drain current	T_a = 25°C	$I_{D,pulse}$ *3	26.4	A
Drain - Source Voltage		V_{DSS}	150	V
Gate - Source voltage (DC)		V_{GSS}	-2 to +8	V
Recommended drive voltage		V_{GS_op}	0 / +5	V
Junction temperature		T_j	150	°C

*1 Limited by maximum temperature allowed.

*2 Limited by electro migration lifetime allowed.

*3 V_{GS}=5V, t_{pulse}=100μs.

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 100μA T_j = 25°C	150	-	-	V
Zero Gate voltage Drain current	I_{DSS}	V_{GS} = 0V, V_{DS}=150V T_j = 25°C	-	10	100	μA
		T_j = 150°C	-	500	-	
Gate - Source leakage current	I_{GSS+}	V_{GS} = 8V, V_{DS} = 0V	-	0.2	200	μA
Gate threshold voltage	$V_{GS (th)}$	V_{DS} = V_{GS}, I_D = 1mA	0.8	1	2.5	V
Static Drain - Source on - state resistance	$R_{DS(on)}$ *4	V_{GS} = 5V, I_D = 2.0A T_j = 25°C	-	40	60	mΩ
		T_j = 150°C	-	80	-	
Gate input resistance	R_G	f = 10MHz, open drain	-	1	-	Ω

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA}	-	48	-	°C/W
Thermal resistance, junction - case	R_{thJC}	-	1.8	-	°C/W

*4 Pulsed

●**Electrical characteristics** (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V V_{DS} = 120V f = 1MHz	-	260	-	pF
Output capacitance	C_{oss}		-	110	-	
Reverse transfer capacitance	C_{rss}		-	1.2	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS} = 0V V_{DS} = 0V to 50V	-	141	-	pF
Effective output capacitance, time related	$C_{o(tr)}$	V_{GS} = 0V V_{DS} = 0V to 50V	-	260	-	pF
Output charge	Q_{oss} *4	V_{DS} = 50V V_{GS} = 0V	-	13	-	nC
Total Gate charge	Q_g *4	V_{DS} = 50V I_D = 5A V_{GS} = 5V/0V	-	2.0	-	nC
Gate - Source charge	Q_{gs} *4		-	0.4	-	
Gate - Drain charge	Q_{gd} *4		-	0.5	-	
Gate plateau voltage	V_{plat}		-	2.0	-	V

●**Reverse conduction electrical characteristics** (T_a = 25°C)

Source-Drain reverse voltage	V_{SD}	V_{GS} = 0V, I_{SD}=1.9A	-	2.0	-	V
Reverse recovery time	t_{rr} *4		-	0	-	ns
Reverse recovery charge	Q_{rr} *4		-	0	-	nC
Peak reverse recovery current	I_{rrm} *4		-	0	-	A

*4 Pulsed

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

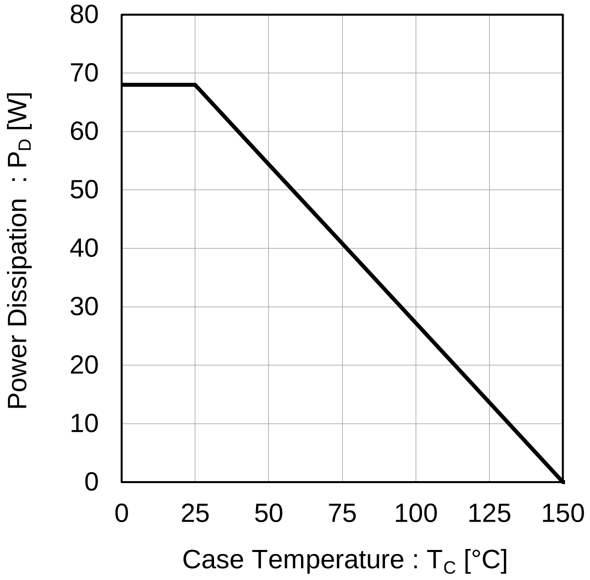


Fig.2 Normalized Transient Thermal Resistance vs. Pulse Width

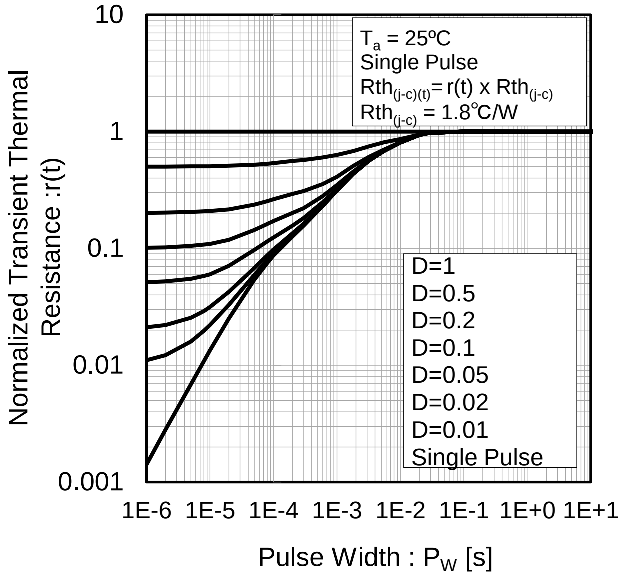
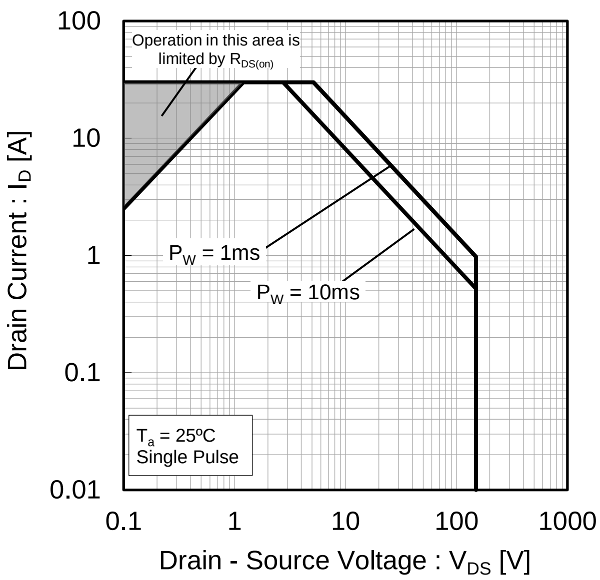


Fig.3 Maximum Safe Operating Area(T_a=25°C)



●Electrical characteristic curves

Fig.4 T_a = 25ºC Typical Output Characteristics

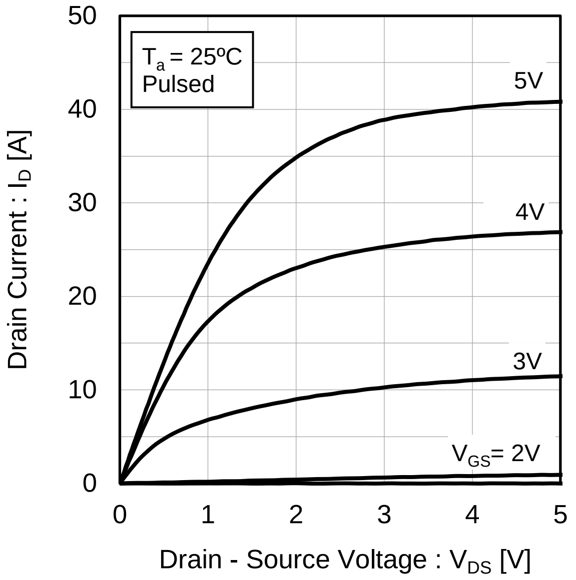


Fig.5 T_a = 150ºC Typical Output Characteristics

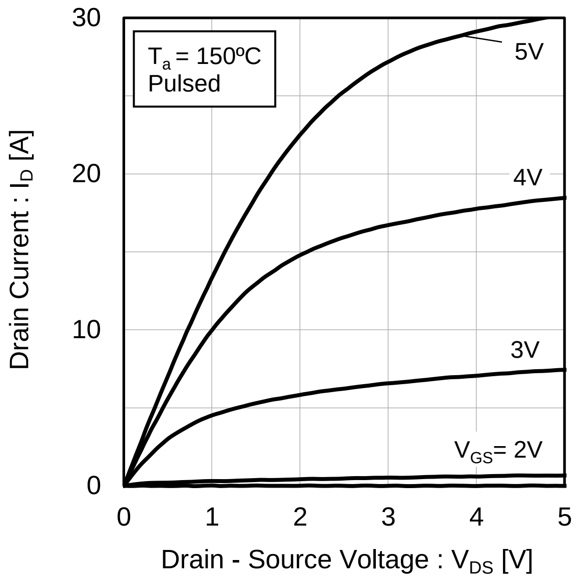


Fig.6 Typical Transfer Characteristics

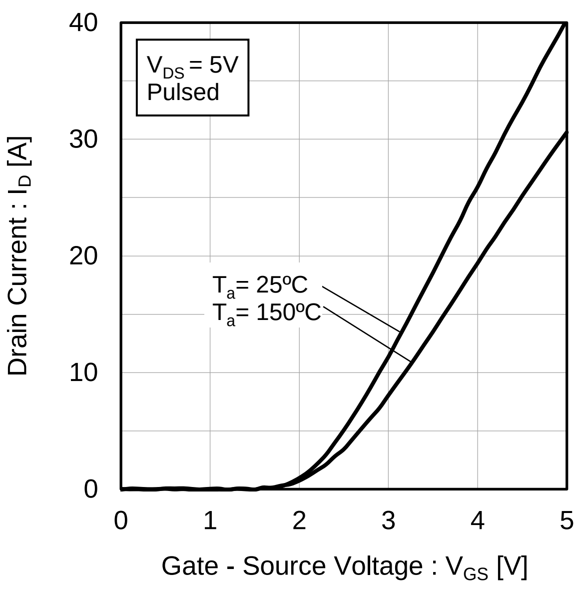
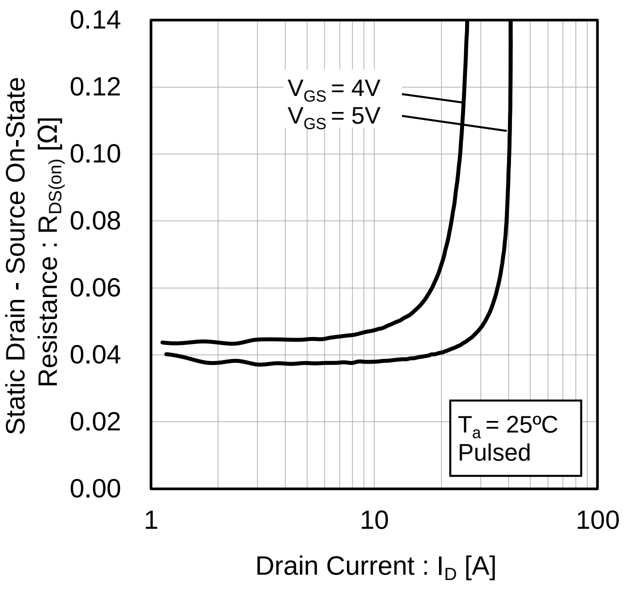


Fig.7 Static Drain - Source On - State Resistance vs. Drain - Source Current



●Electrical characteristic curves

Fig.8 3rd Quadrant Characteristics

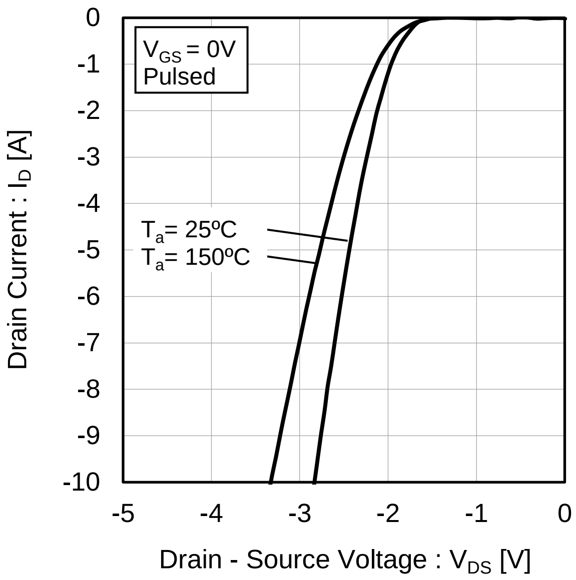


Fig.9 Typical Capacitance vs. Drain - Source Voltage

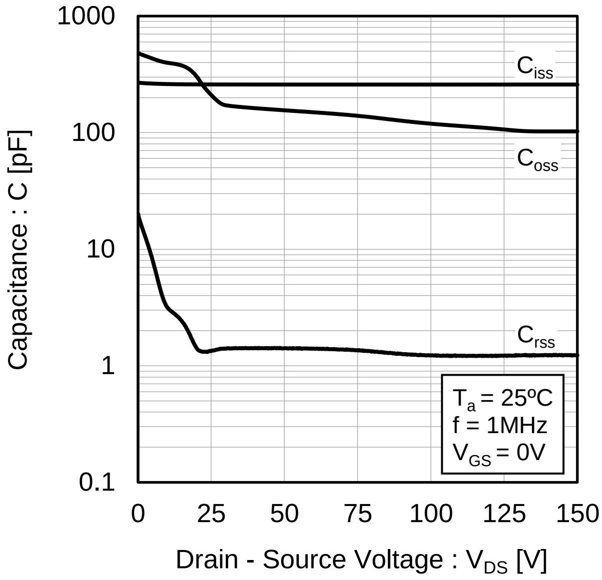
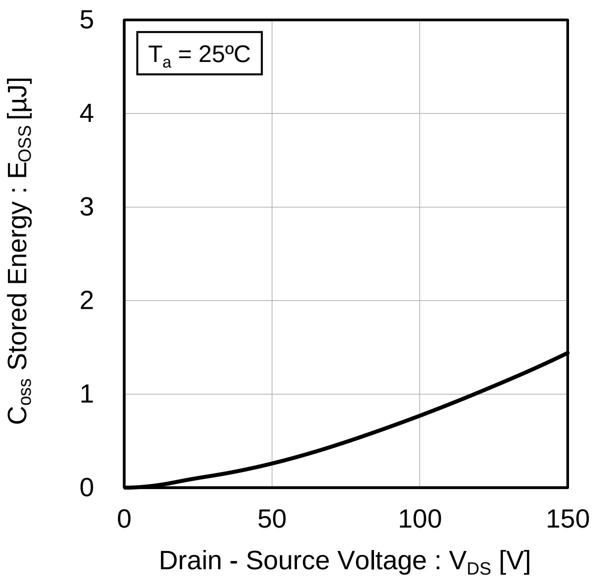
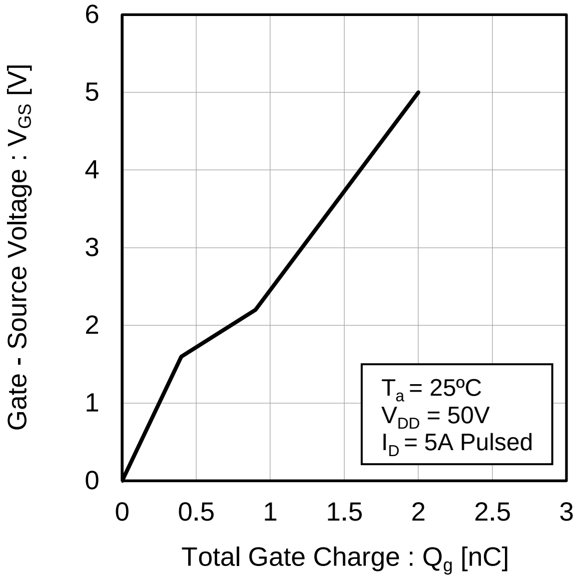


Fig.10 C_{oss} Stored Energy

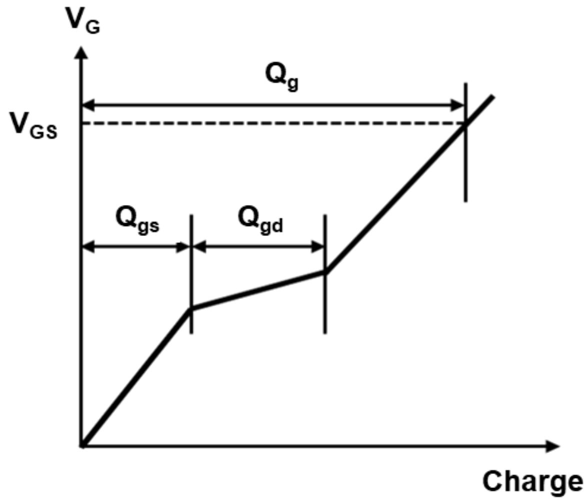


●Electrical characteristic curves

Fig.13 Dynamic Input Characteristics

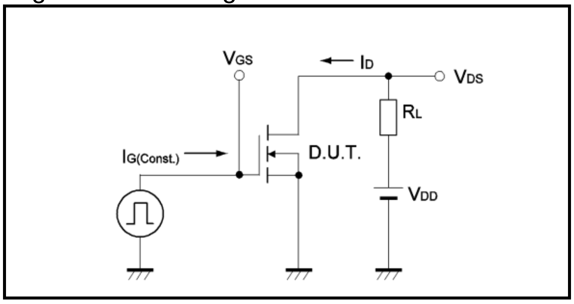


*Gate Charge Waveform



●Measurement circuits and waveforms

Fig.1-1 Gate Charge Measurement Circuit



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JAPAN	USA	EU	CHINA
CLASSⅢ	CLASSⅢ	CLASSⅡb	CLASSⅢ
CLASSⅣ		CLASSⅢ	

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   [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
   [f] Sealing or coating our Products with resin or other coating materials
   [g] Use of our Products without cleaning residue of flux (Exclude cases where no-clean type fluxes is used. However, recommend sufficiently about the residue.) ; or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
   [h] Use of the Products in places subject to dew condensation

4. The Products are not subject to radiation-proof design.

5. Please verify and confirm characteristics of the final or mounted products in using the Products.

6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse, is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

7. De-rate Power Dissipation depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction temperature.

8. Confirm that operation temperature is within the specified range described in the product specification.

9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.

2. In principle, the reflow soldering method must be used on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.

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Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
   [a] the Products are exposed to sea winds or corrosive gases, including Cl_2, H_2S, NH_3, SO_2, and NO_2
   [b] the temperature or humidity exceeds those recommended by ROHM
   [c] the Products are exposed to direct sunshine or condensation
   [d] the Products are exposed to high Electrostatic

2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.

3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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