

### FEATURES

- GaN-on-Silicon E-Mode HEMT Technology
- Industry Application
- Very Low Gate Charge
- Ultra-Low On-Resistance
- Very Small Footprint
- RoHS Compliant and Halogen Free

### APPLICATIONS

High Frequency DC/DC Converter  
 High Density DC/DC Power Module  
 Synchronous Rectification  
 Motor Driver  
 Solar System MPPT & Solar Power Optimizer

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNITS
Drain-to-Source Voltage	$V_{DS}$	100	V
Drain-to-Source Voltage <sup>(1)</sup> ( $V_{GS} = 0V$ , 1h total time, $T_A = T_{JMAX}$ )	$V_{DS\_TR}$	120	
Gate-to-Source Voltage	$V_{GS}$	6	V
Gate-to-Source Voltage <sup>(1)</sup> ( $V_{DS} = 0V$ , 168h total time, $T_A = T_{JMAX}$ )	$V_{GS\_TR}$	-4	
Drain Current	$I_D$	$T_C = +25^\circ C$	93
		$T_A = +25^\circ C$	13
Drain Current (Pulse) <sup>(2)</sup>	$I_{DM}$	175	A
Total Dissipation	$P_D$	$T_C = +25^\circ C$	112
		$T_A = +25^\circ C$	2.2
Junction Temperature	$T_J$	-40 to +150	$^\circ C$
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ C$
Lead Temperature (Soldering, 10s)		+260	$^\circ C$

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

NOTES:

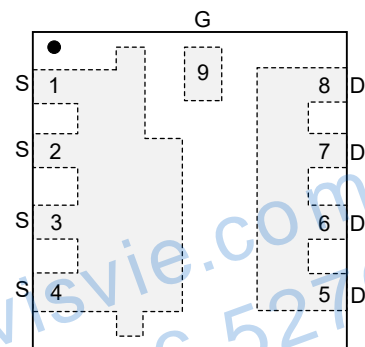
1. Provided as measure of robustness under abnormal operating conditions and not recommended for normal operation.
2.  $V_{GS} = 5V$ ,  $T_J = +25^\circ C$ ,  $t_{PULSE} = 100\mu s$ .

### PRODUCT SUMMARY

$R_{DS(on)}$ (TYP) $V_{GS} = 5V$	$R_{DS(on)}$ (MAX) $V_{GS} = 5V$	$I_D$ (MAX) $T_C = +25^\circ C$
5.8m $\Omega$	7m $\Omega$	93A

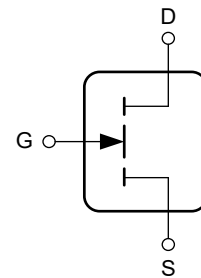
### PIN CONFIGURATION

(TOP VIEW)



TLGA-3.3x3.3-9AL

### EQUIVALENT CIRCUIT



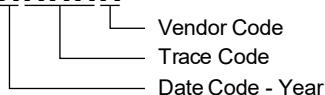
**PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGMGQ58410	TLGA-3.3×3.3-9AL	-40°C to +150°C	SGMGQ58410TTLBH9G/TR	58410 XXXXX	Tape and Reel, 2500

**MARKING INFORMATION**

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.

**XXXXX**



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

**DISCLAIMER**

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

**THERMAL RESISTANCE**

PARAMETER	SYMBOL	TYP	UNITS
Junction-to-Ambient Thermal Resistance <sup>(1)</sup>	R <sub>θJA</sub>	52.7	°C/W
Junction-to-Board Thermal Resistance	R <sub>θJB</sub>	9.7	°C/W
Junction-to-Case Thermal Resistance	R <sub>θJC</sub>	1	°C/W

NOTE: 1. R<sub>θJA</sub> is determined with the device on FR4 PCB (2s2p with thermal vias) defined in accordance with JEDEC standards. PCB is mounted in horizontal position without air stream cooling.

**ELECTRICAL CHARACTERISTICS**(T<sub>J</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>Static Characteristics</b>						
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 100V	T <sub>J</sub> = +25°C	0.5	43	μA
			T <sub>J</sub> = +125°C	100		
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = 6V		0.2	43	μA
		V <sub>GS</sub> = 6V, T <sub>J</sub> = +125°C		20		
		V <sub>GS</sub> = -4V		0.1	43	
Gate-to-Source Threshold Voltage	V <sub>GS_TH</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 3.2mA	0.8	1.1	2.1	V
Drain-to-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 5V, I <sub>D</sub> = 2.5A		5.8	7	mΩ
Gate Resistance	R <sub>G</sub>	f = 5MHz, open drain		1.1		Ω
Source-to-Drain Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0V, I <sub>S</sub> = 16A		2.3		V
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 50V		407		pF
Output Capacitance	C <sub>OSS</sub>			175		
Reverse Transfer Capacitance	C <sub>RSS</sub>			2.6		
Effective Output Capacitance, Energy Related	C <sub>O_ER</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V to 50V		242		
Effective Output Capacitance, Time Related	C <sub>O_TR</sub>			346		
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> = 5V, V <sub>DS</sub> = 0V to 50V, I <sub>D</sub> = 16A		3.4		nC
Gate-to-Source Charge	Q <sub>GS</sub>			0.8		
Gate-to-Drain Charge	Q <sub>GD</sub>			0.5		
Gate Plateau Voltage	V <sub>PLAT</sub>	V <sub>GS</sub> = 0V to 5V, V <sub>DS</sub> = 50V, I <sub>D</sub> = 16A		2		V
Gate Charge at Threshold	Q <sub>G_TH</sub>	V <sub>GS</sub> = 5V, V <sub>DS</sub> = 0V to 50V, I <sub>D</sub> = 16A		0.5		nC
Output Charge	Q <sub>OSS</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V to 50V		17.3		
Reverse Recovery Charge	Q <sub>RR</sub>	V <sub>DS</sub> = 50V, I <sub>S</sub> = 16A		0		

TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 1 Typ. Output Characteristics ( $T_J = 25\text{ }^\circ\text{C}$ )

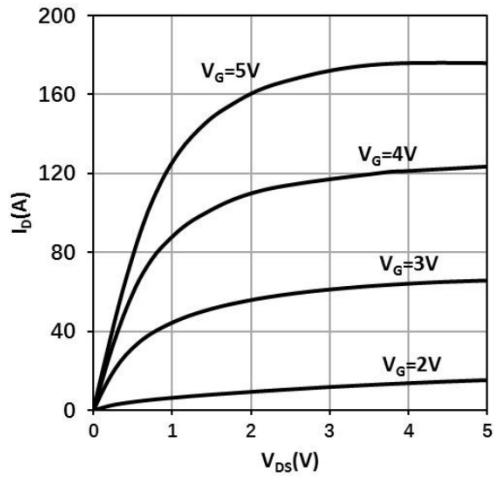


Fig. 2 Typ. Output Characteristics ( $T_J = 125\text{ }^\circ\text{C}$ )

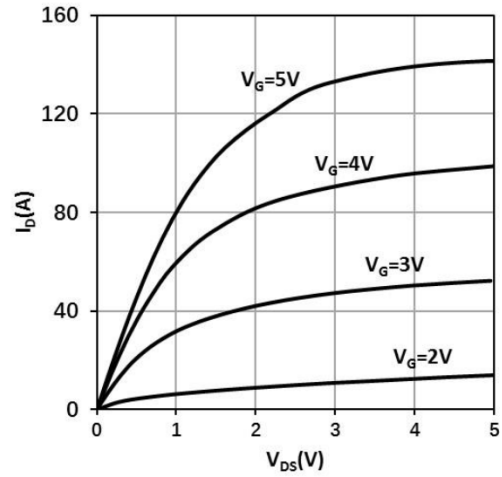


Fig. 3 Typ. Drain On-state Resistance ( $T_J = 25\text{ }^\circ\text{C}$ )

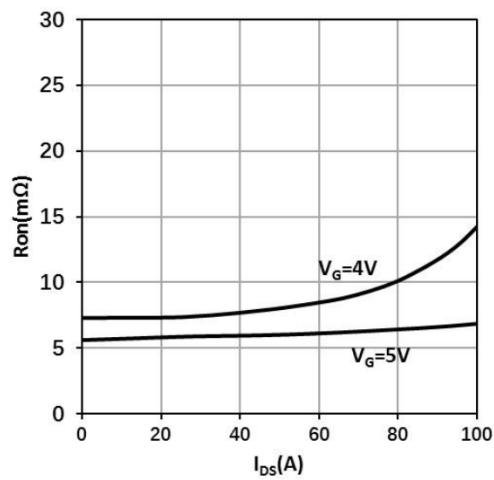
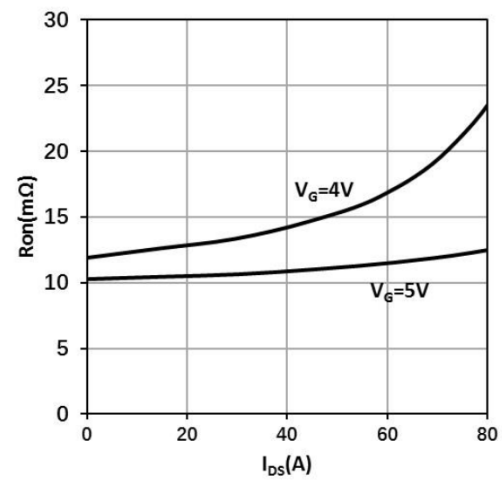


Fig. 4 Typ. Drain On-state Resistance ( $T_J = 125\text{ }^\circ\text{C}$ )



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Fig. 5 Normalized On-State Resistance vs. Temp.

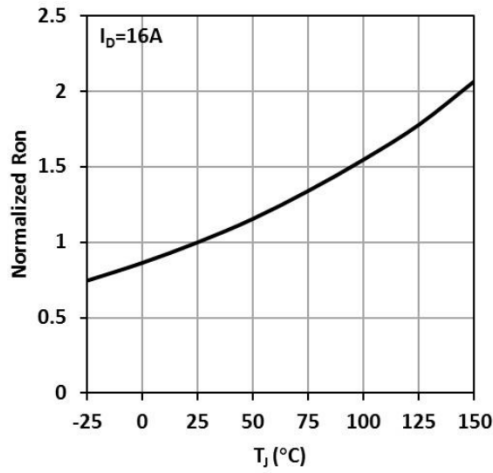


Fig. 6 Typ. Transfer Characteristics

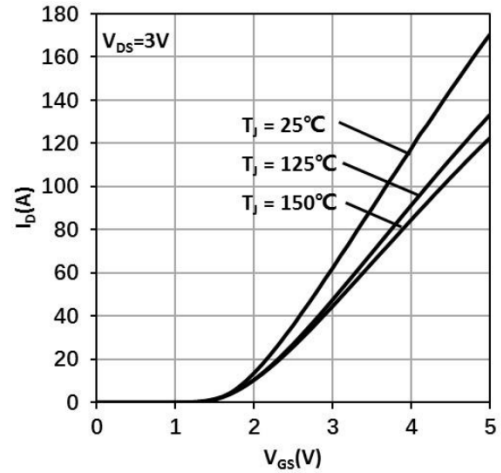


Fig. 7 Typ. Reverse Drain-Source Characteristics ( $V_{GS} \leq 0$ ,  $T_J = 25^\circ C$ )

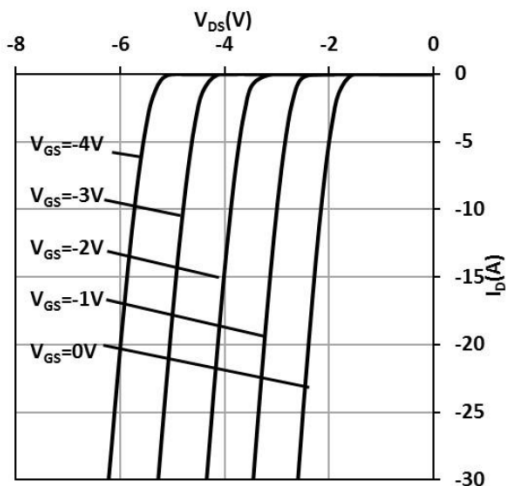
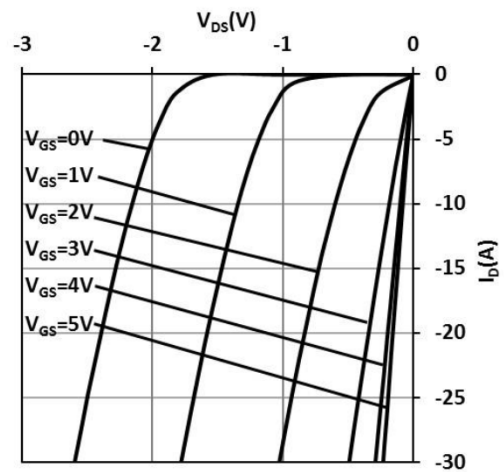


Fig. 8 Typ. Reverse Drain-Source Characteristics ( $V_{GS} \geq 0$ ,  $T_J = 25^\circ C$ )



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Fig. 9 Typ. Reverse Drain-Source Characteristics  
( $V_{GS} \leq 0$ ,  $T_J = 125^\circ\text{C}$ )

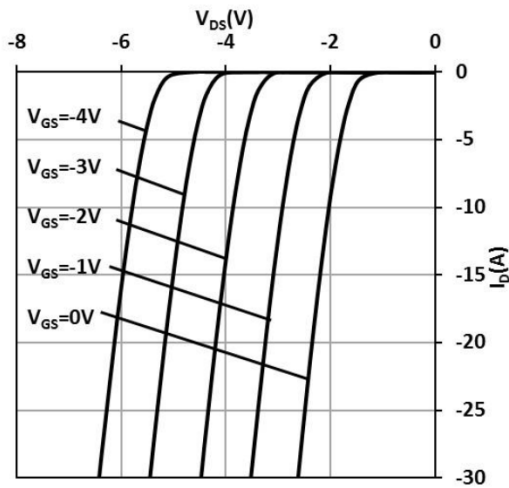


Fig. 10 Typ. Reverse Drain-Source Characteristics  
( $V_{GS} \geq 0$ ,  $T_J = 125^\circ\text{C}$ )

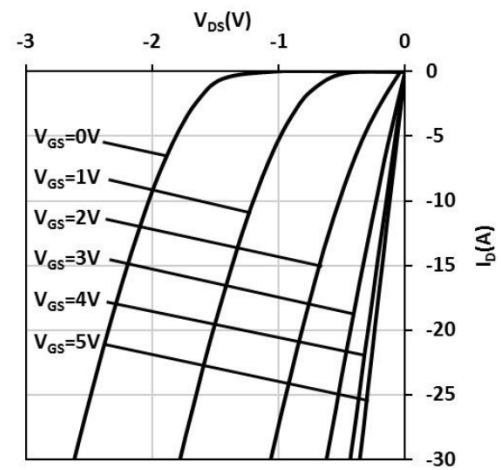


Fig. 11 Typ. Capacitances Characteristics

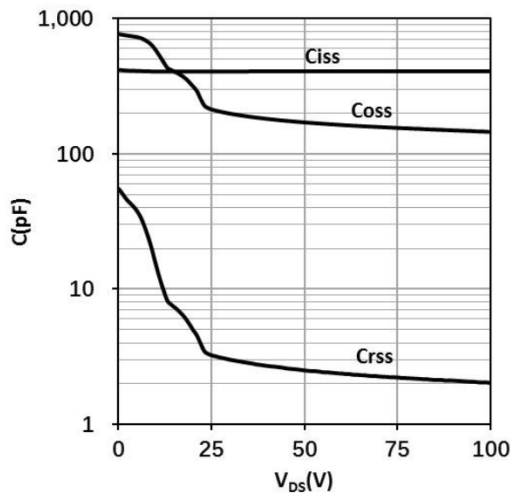
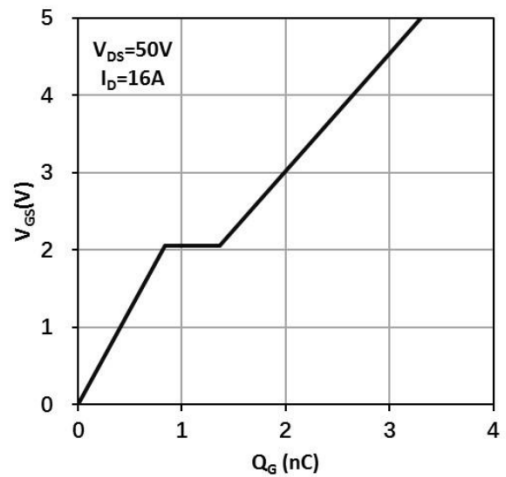


Fig. 12 Typ. Gate Charge



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Fig. 13 Normalized Threshold Voltage vs. Temp.

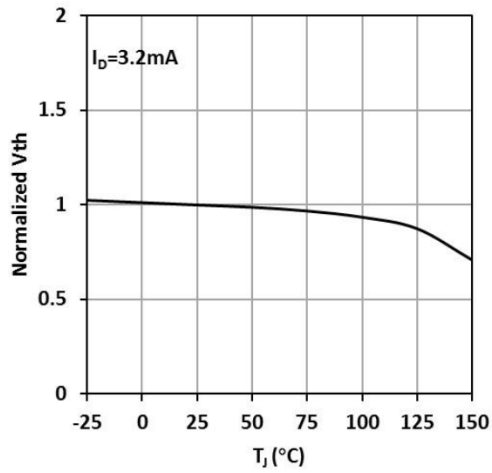


Fig. 14 Typ. Output Charge

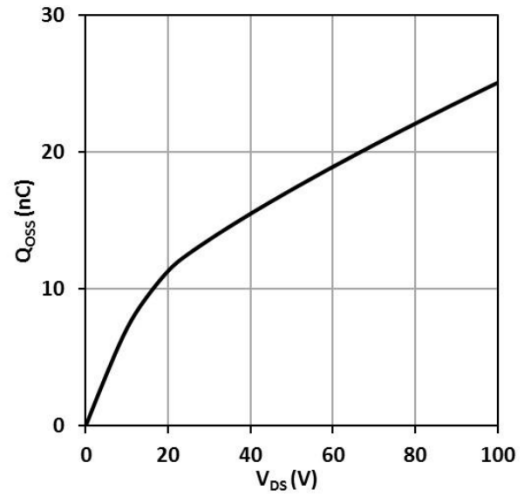


Fig. 15 Typ. Output Capacitance Stored Energy

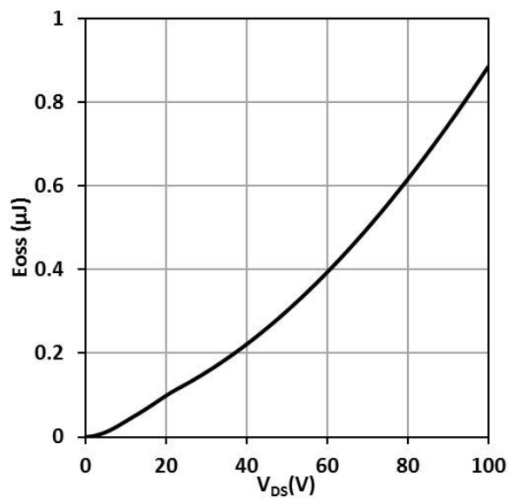
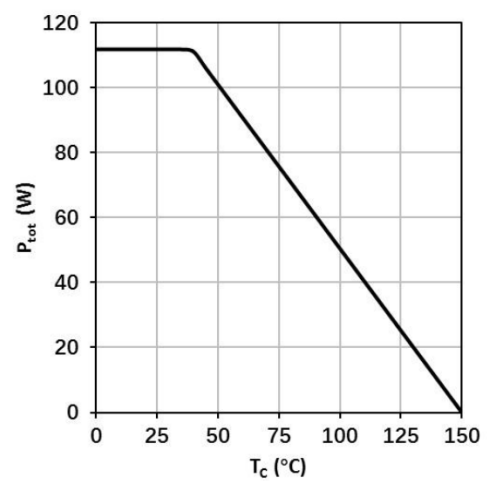


Fig. 16 Power Dissipation  $P_{tot} = f(T_c)$ ,  $R_{\theta JC} = 1.0$  °C/W



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Fig. 17 Power Dissipation  $P_{tot} = f(T_A)$ ,  $R_{\theta JA} = 52.7 \text{ }^\circ\text{C/W}$

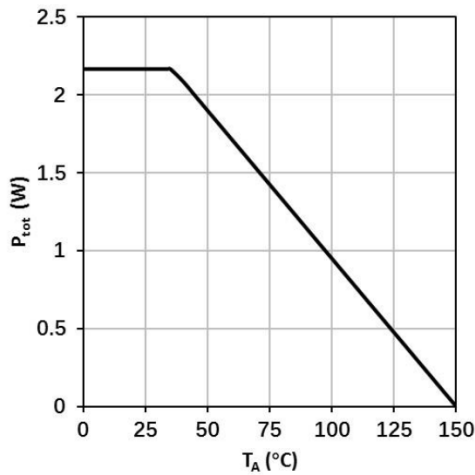


Fig. 18 Typ. Gate-to-Source Leakage Characteristics  $I_g = f(V_{GS})$ ; Drain Open

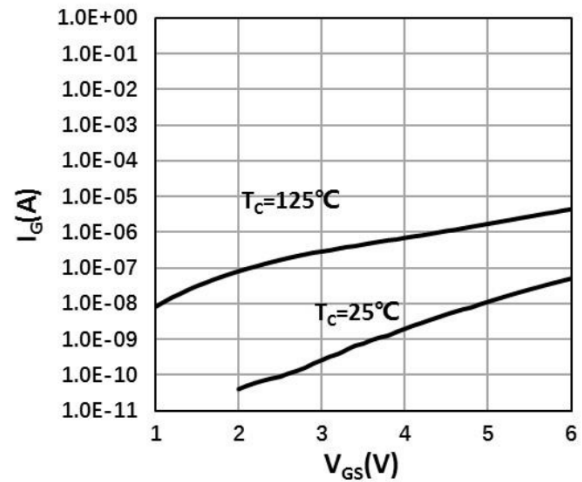


Fig. 19 Typ. Drain-source Leakage Characteristics  $I_{DSS} = f(V_{DS})$ ;  $V_{GS} = 0 \text{ V}$

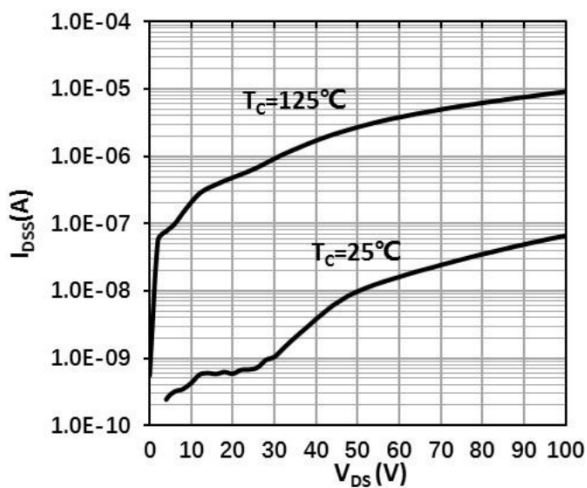
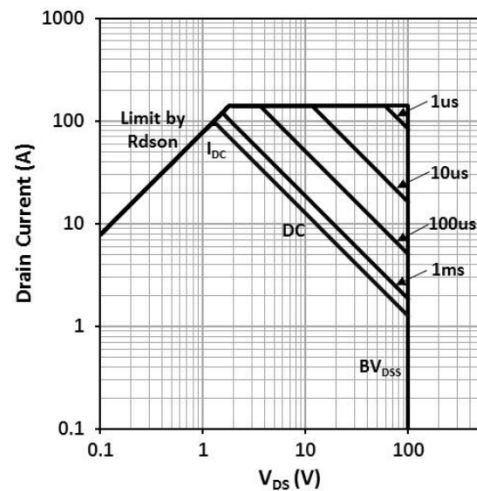


Fig. 20 Safe Operating Area  $I_D = f(V_{DS})$ ;  $T_c = 25 \text{ }^\circ\text{C}$ ; single pulse; parameter:  $t_p$



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Fig. 21 Safe Operating Area

$I_D = f(V_{DS})$ ;  $T_c = 125\text{ }^\circ\text{C}$ ; single pulse; parameter:  $t_p$

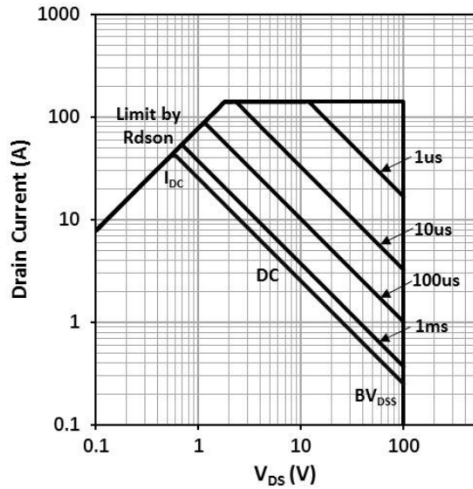
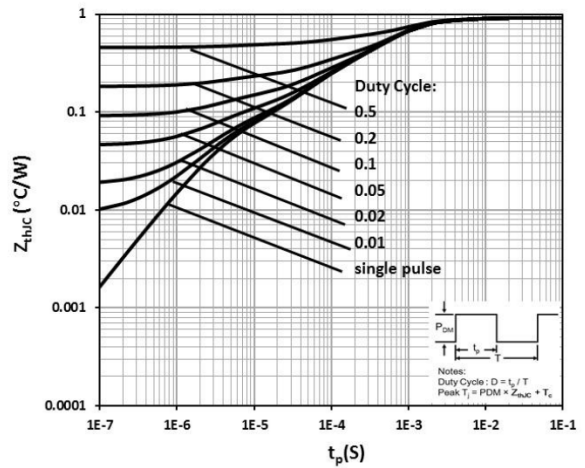


Fig. 22 Max. Transient Thermal Impedance

$Z_{thJC} = f(t_p)$ ; parameter:  $D=t_p/T$



REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original to REV.A (JUNE 2026)

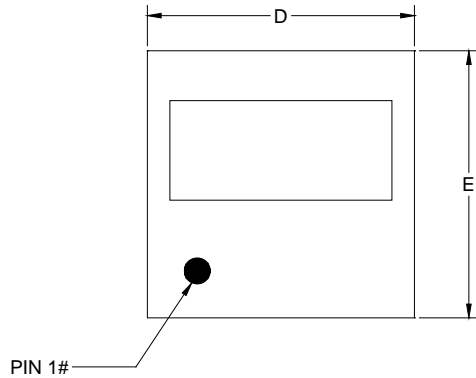
Page

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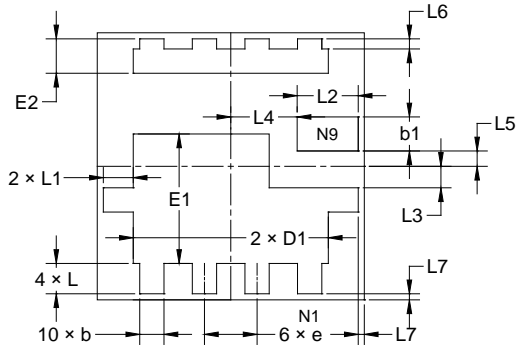
# PACKAGE INFORMATION

## PACKAGE OUTLINE DIMENSIONS

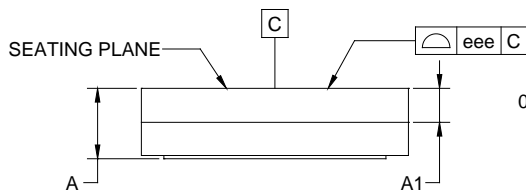
### TLGA-3.3x3.3-9AL



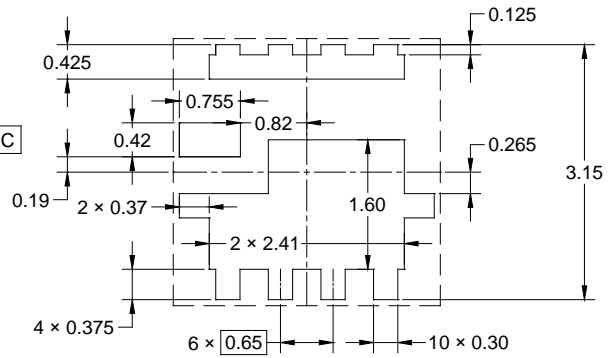
TOP VIEW



BOTTOM VIEW



SIDE VIEW



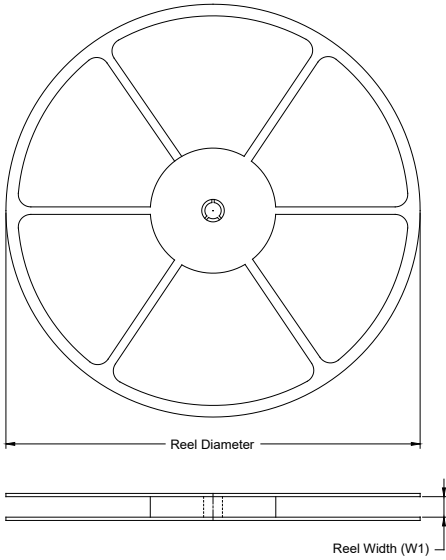
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.770	-	0.970
A1	0.420 REF		
b	0.250	-	0.350
b1	0.370	-	0.470
D	3.200	-	3.400
D1	2.310	-	2.510
E	3.200	-	3.400
E1	1.500	-	1.700
E2	0.325	-	0.525
e	0.650 BSC		
L	0.325	-	0.425
L1	0.320	-	0.420
L2	0.705	-	0.805
L3	0.265 REF		
L4	0.820 REF		
L5	0.190 REF		
L6	0.125 REF		
L7	0.075 REF		
eee	0.100		

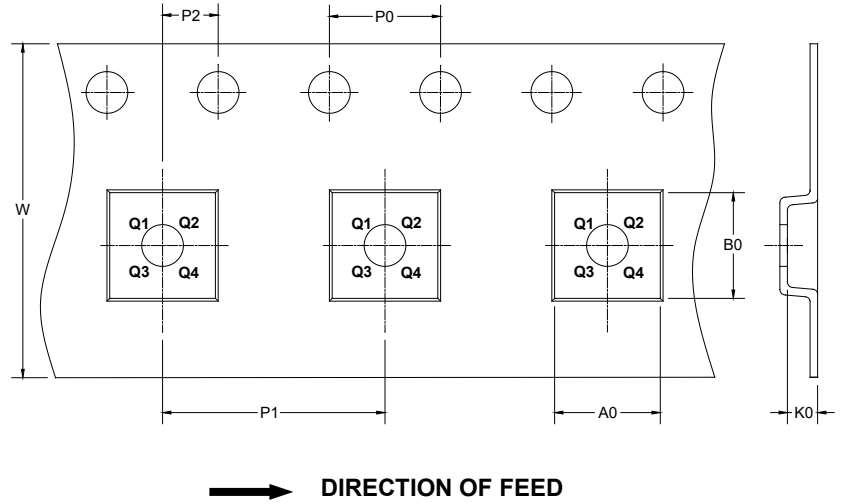
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

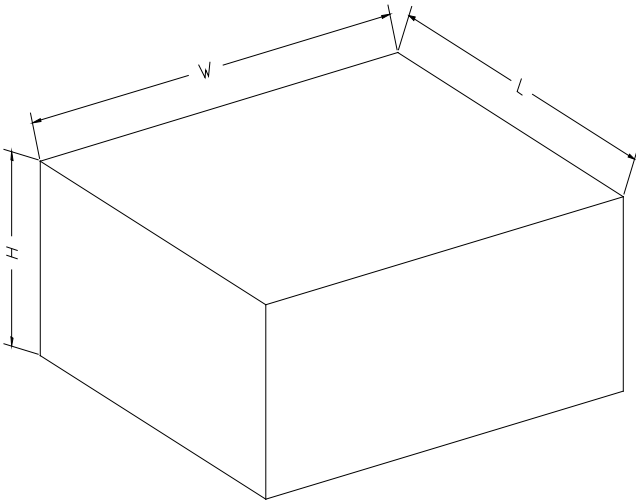
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TLGA-3.3×3.3-9AL	13"	12.4	3.55	3.55	1.20	4.0	8.0	2.0	12.0	Q2

DD0001

# PACKAGE INFORMATION

## CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

## KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
13"	386	280	370	5

DD0002