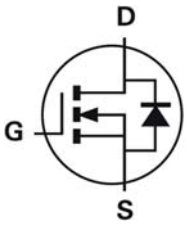
SG30N05E

30V N-Channel Power MOSFET

	PDFN 3.3x3.3-8L	
V_{DSS} , 30V $R_{DS(ON)}$, 9.5mΩ (max.) @ V_{GS}=10V $R_{DS(ON)}$, 14mΩ (max.) @ V_{GS}=4.5V I_D , 42A		

Description

The SG30N05E uses advanced Trench technology and designs to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

Features

- Low On-Resistance
- Low Input Capacitance
- Low Miller Charge
- Low Input / Output Leakage
- Pb-free lead plating; RoHS compliant

Applications

- Motor / Body Load Control
- Automotive Systems
- Load Switch
- DC-DC converters and Off-line UPS

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
SG30N05E	Halogen-Free	PDFN 3.3x3.3-8L	E	Tape & Reel	5,000

Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current-Continuous	T_C=25°C	I_D	42	A
	T_C=100°C		27	A
	T_A=25°C		10	A
	T_A=70°C		7	A
Drain Current-Pulsed Note 1		I_{DM}	80	A
Avalanche Current		I_{AS}	24	A
Avalanche Energy, L=0.1mH		E_{AS}	28.8	mJ
Maximum Power Dissipation	T_C=25°C	P_D	26	W
	T_C=100°C		10.4	W
	T_C=25°C		1.7	W
	T_C=70°C		1.1	W
Operating Junction Temperature Range		T_J T_{STG}	-55 to +175	°C

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Maximum Junction-to-Ambient	$R_{\theta JA}$	Steady State	-	-	75	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	Steady State	-	-	4.8	°C/W

Electrical Characteristics (T_J=25°C unless otherwise noted)

OFF CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_{DS}=250μA	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V	-	-	1	μA
Gate-Body Leakage	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA

ON CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_{DS}=250μA	1.2	-	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_{DS}=15A	-	-	9.5	mΩ
Drain-Source On-State Resistance		V_{GS}=4.5V, I_{DS}=10A	-	-	14	mΩ
Forward Transconductance Note 1	g_{fs}	V_{DS}=5V, I_D=15A	-	22	-	S

DYNAMIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, f=1MHz	-	878	-	pF
Output Capacitance	C_{oss}		-	123	-	
Reverse Transfer Capacitance	C_{rss}		-	105	-	
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	1.8	-	Ω

SWITCHING CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=15V, I_D=20A, V_{GS}=10V, Rg=1.5Ω	-	6.3	-	ns
Rise Time	t_r		-	38	-	
Turn-Off Delay Time	$T_{d(off)}$		-	20	-	
Fall Time	t_f		-	4.6	-	
Total Gate Charge	Q_g	V_{DS}=15V, I_{DS}=12A, V_{GS}=4.5V	-	9.7	-	nC
Gate to Source Gate Charge	Q_{gs}		-	2.1	-	
Gate to Drain “Miller” Charge	Q_{gd}		-	5.4	-	

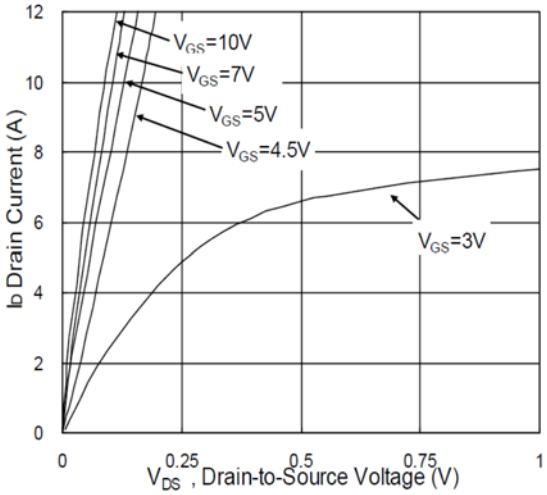
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Maximum Body-Diode Continuous Current	I_S	V_G=V_D=0V, Force Current	-	-	42	A
Pulsed Source Current	I_{SM}	V_G=V_D=0V, Force Current	-	-	80	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=1A	-	0.8	1.2	V

Notes:

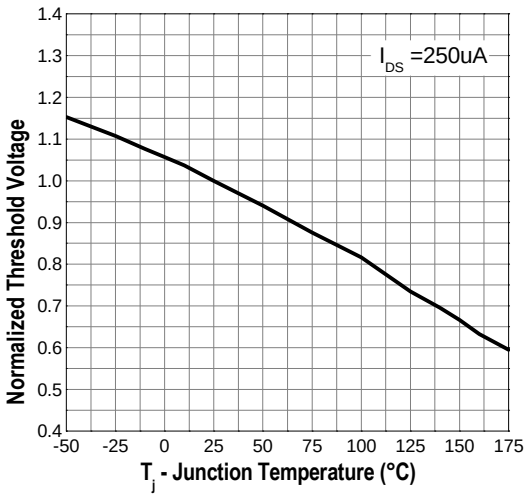
1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
2. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 in still air.

Typical Operating Characteristics

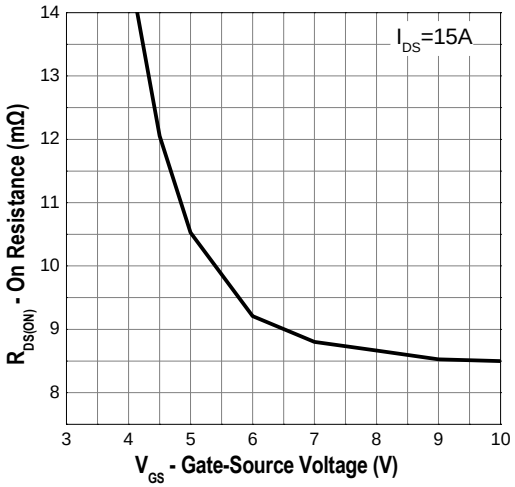
Output Characteristics



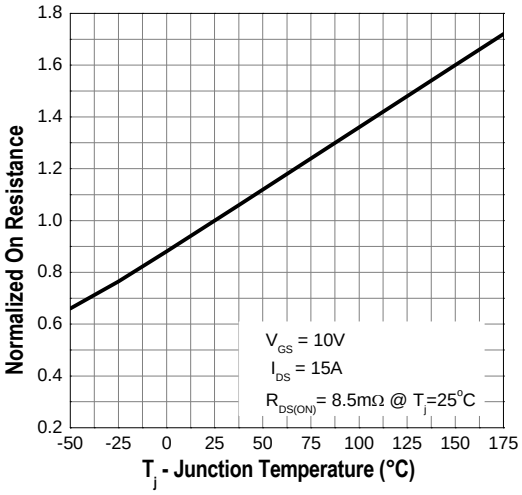
Gate Threshold Voltage



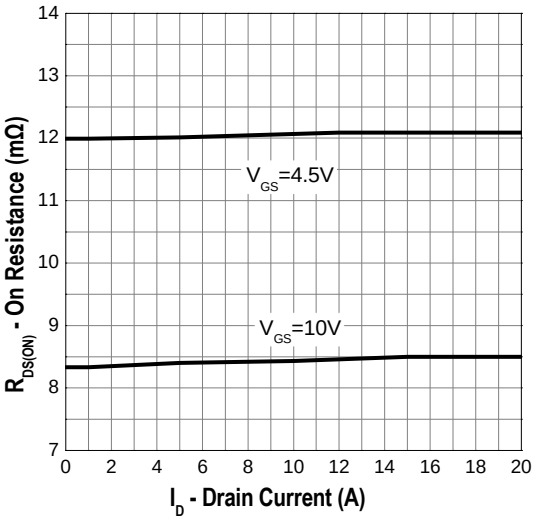
Gate-Source On Resistance



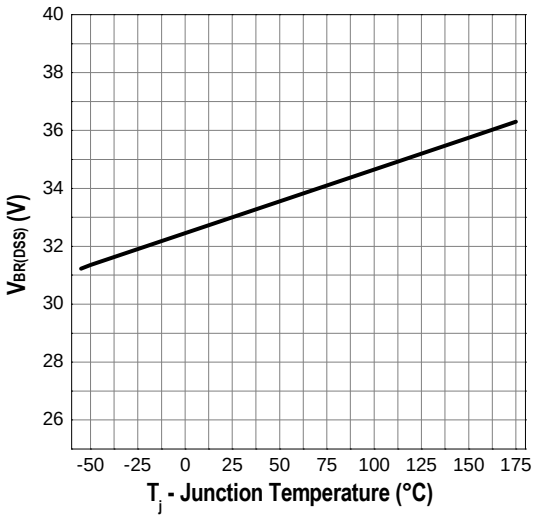
Drain-Source On Resistance



Drain-Source On Resistance

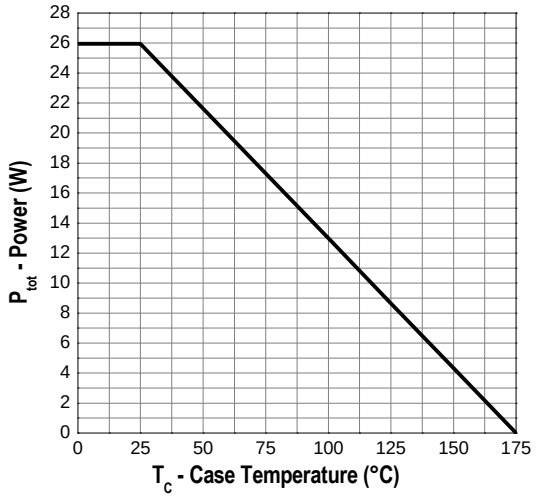


Drain-source Breakdown Voltage

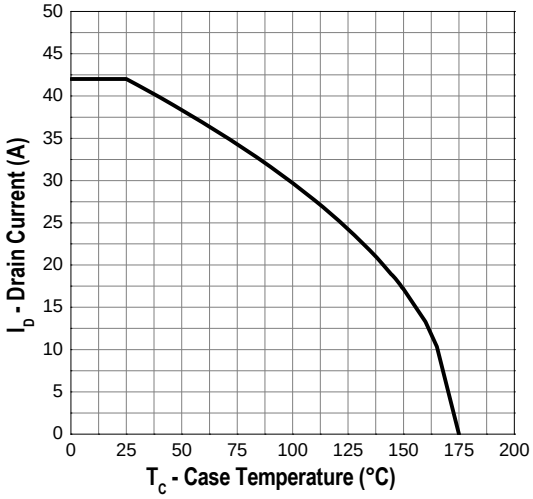


Typical Operating Characteristics (Cont.)

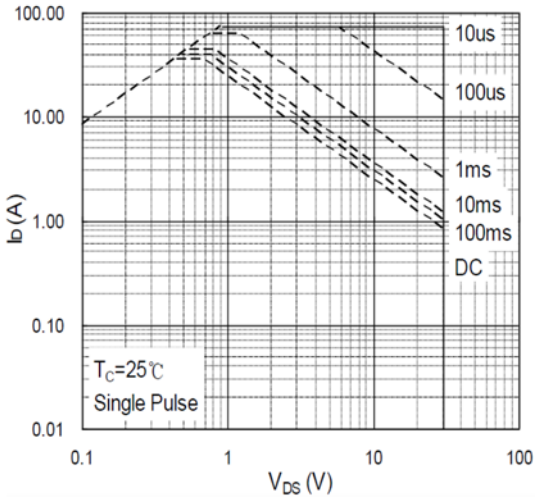
Power Dissipation



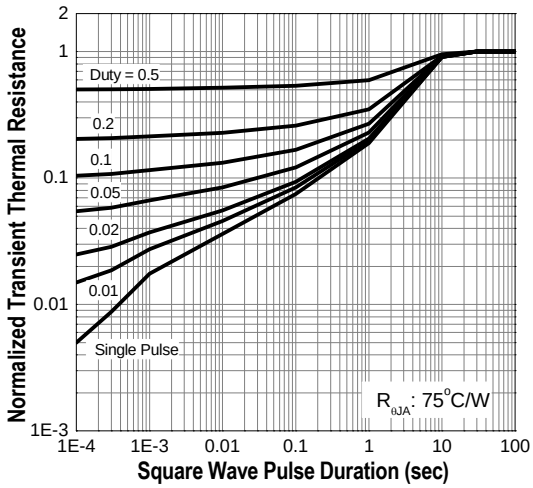
Drain Current



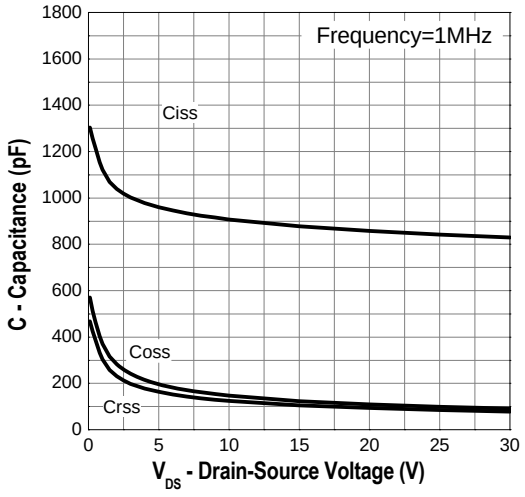
Safe Operation Area



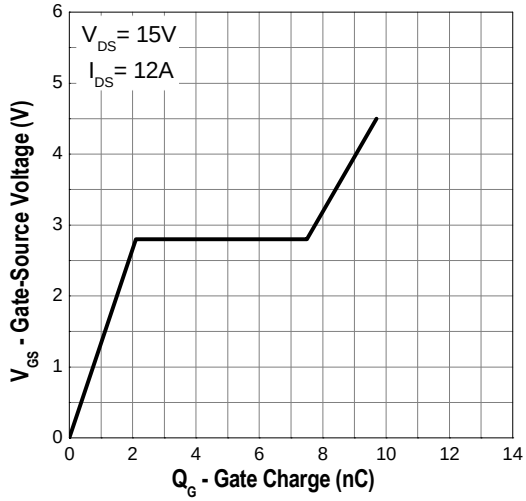
Transient Thermal Impedance



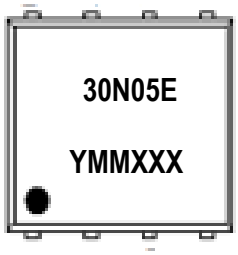
Capacitance



Gate Charge



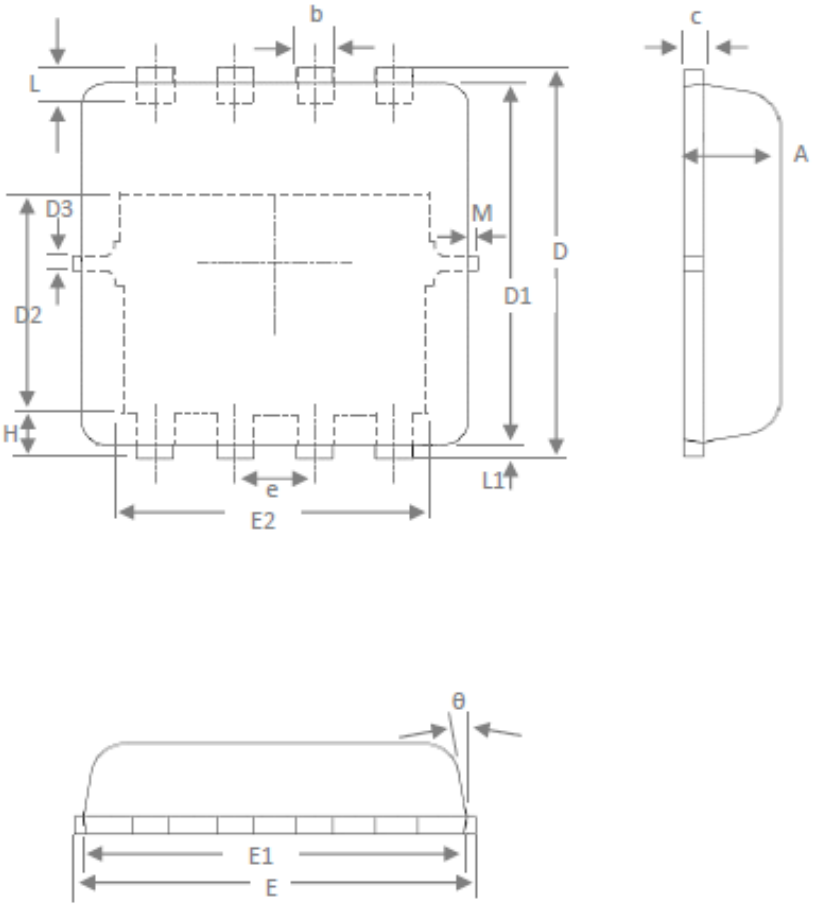
Marking Information

PDFN 3.3x3.3-8L (E)	Marking Rule
Laser Marking  **Diagram**	Line 1：Device 30N05E Line 2：Date Code YMMXXX Y：Year Code MM：Month Code XXX：Serial Number Year Code Description As Below

Year Code Description

Year Code	Year	
0	2010	2020
1	2011	2021
2	2012	2022
3	2013	2023
4	2014	2024
5	2015	2025
6	2016	2026
7	2017	2027
8	2018	2028
9	2019	2029

Package of Dimension



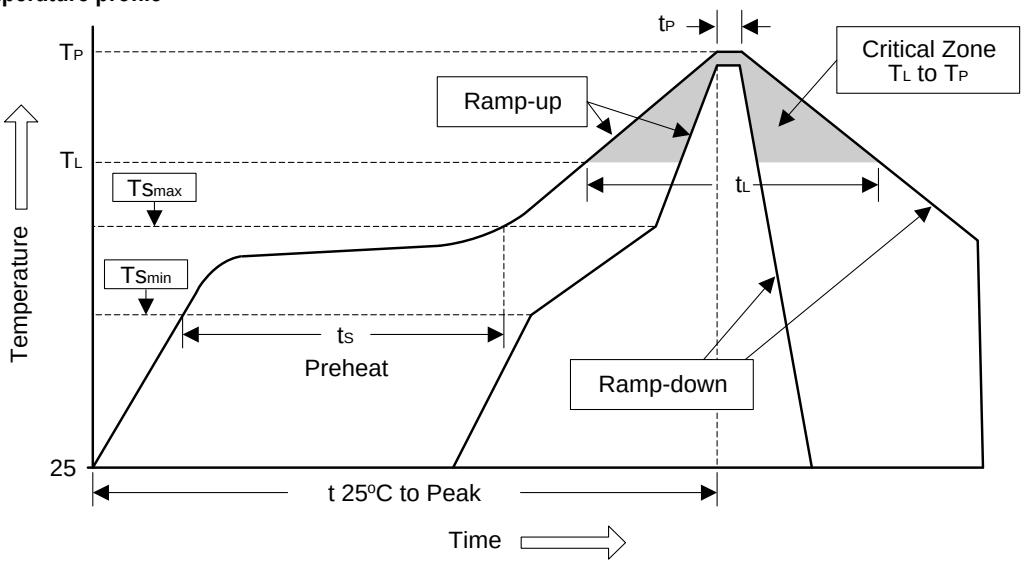
Symbol	Min	Nor	Max
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.48	1.58	1.68
D3	-	0.13	-
E	3.00	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e		0.65BSC	
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	-	0.13	-
θ	-	10°	12°
M	-	-	0.15

Note:
1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs.
   Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body
   Exclusive Of Mold Flash, Tie Bar Burrs, Gate Burrs And Interlead Flash,
   But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.

Soldering Methods for Silicongear's Products

1. Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60 to 120 sec	 150°C 200°C 60 to 180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60 to 150 sec	 217°C 60 to 150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec

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