

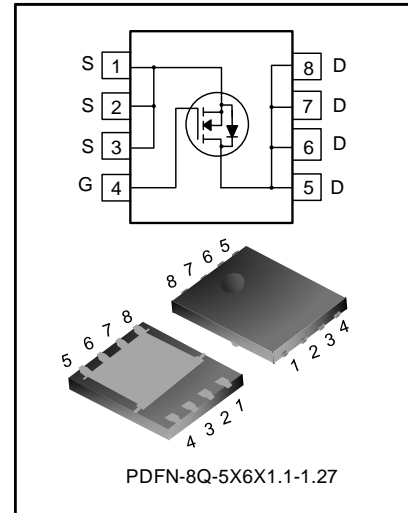
160A, 40V N-CHANNEL MOSFET

DESCRIPTION

SVGQ041R7NL5V-2HS is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan's LVMOS technology. The improved process and cell structure have been especially tailored to minimize on-state resistance, provide superior switching performance and high avalanche breakdown tolerance. This device is widely used in 12V motor control system, Start-stop micro-hybrid and so on.

FEATURES

- ◆ AEC-Q101 qualified
- ◆ 160A, 40V, $R_{DS(on)(typ.)}=1.4m\Omega@V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low Crss
- ◆ Fast switching
- ◆ Extreme dv/dt rated
- ◆ 100% avalanche tested
- ◆ Pb-free lead plating
- ◆ RoHS compliant
- ◆ Wettable flanks
- ◆ Max. junction temperature: $T_{jmax.}=175^{\circ}C$



KEY PERFORMANCE PARAMETERS

Characteristics	Ratings	Unit
V_{DS}	40	V
$V_{GS(th)}$	2.4~3.4	V
$R_{DS(on),max}$	1.7	$m\Omega$
I_D	160	A
$Q_{g,typ}$	72	nC

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVGQ041R7NL5V-2HSTR	PDFN-8Q-5X6X1.1-1.27	Q41R7-2HS	Halogen free	Tape & Reel

ABSOLUTE MAXIMUM RATINGS (UNLESS OTHERWISE NOTED, T_J=25°C)

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Voltage	V _{DS}	--	40	--	--	V
Gate-source Voltage	V _{GS}	--	-20	--	20	V
Drain Current (Note 1)	I _D	T _C =25°C	--	--	160	A
		T _C =100°C	--	--	113	A
Drain Current Pulsed (Note 2)	I _{DM}	T _C =25°C	--	--	640	A
Power Dissipation (Note 3)	P _D	T _C =25°C	--	--	115.4	W
Single Pulsed Avalanche Energy	E _{AS}	L=0.1mH, V _{DD} =32V, R _G =25Ω, starting temperature T _J =25°C	--	--	192	mJ
Single Pulsed Avalanche Current	I _{AS}	--	--	--	62	A
Operation Junction Temperature Range	T _J	--	-55	--	175	°C
Storage Temperature Range	T _{stg}	--	-55	--	175	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Thermal Resistance, Junction-case, Bottom	R _{θJC}	--	--	--	1.3	°C/W
Thermal Resistance, Junction-ambient	R _{θJA}	--	--	--	50	°C/W
Soldering Temperature(SMD)	T _{sold}	Reflow soldering: 10 ± 1 sec, 3times	--	--	260	°C

ELECTRICAL CHARACTERISTICS (UNLESS OTHERWISE NOTED, $T_J=25^\circ\text{C}$)

Static characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40	--	--	V
Drain-source Leakage Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V, T_J=25^\circ\text{C}$	--	--	1.0	μA
		$V_{DS}=40V, V_{GS}=0V, T_J=150^\circ\text{C}$	--	5.0	--	
Gate-source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.4	--	3.4	V
Static Drain-source On State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=40A$	--	1.4	1.7	$m\Omega$
Gate Resistance	R_g	$f=1\text{MHz}$	--	1.1	--	Ω

Dynamic characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Input Capacitance	C_{iss}	$f=1\text{MHz}, V_{GS}=0V, V_{DS}=25V$	--	4310	--	pF
Output Capacitance	C_{oss}		--	1221	--	
Reverse Transfer Capacitance	C_{rss}		--	59	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, V_{GS}=10V, R_G=5.0\Omega, I_D=25A$ (Notes 4, 5)	--	25	--	ns
Turn-on Rise Time	t_r		--	46	--	
Turn-off Delay Time	$t_{d(off)}$		--	59	--	
Turn-off Fall Time	t_f		--	23	--	
Total Gate Charge	Q_g	$V_{DD}=20V, V_{GS}=10V, I_D=25A$ (Notes 4, 5)	--	72	--	nC
Gate-source Charge	Q_{gs}		--	24	--	
Gate-drain Charge	Q_{gd}		--	15	--	
Gate-plateau Voltage	$V_{plateau}$		--	5.2	--	

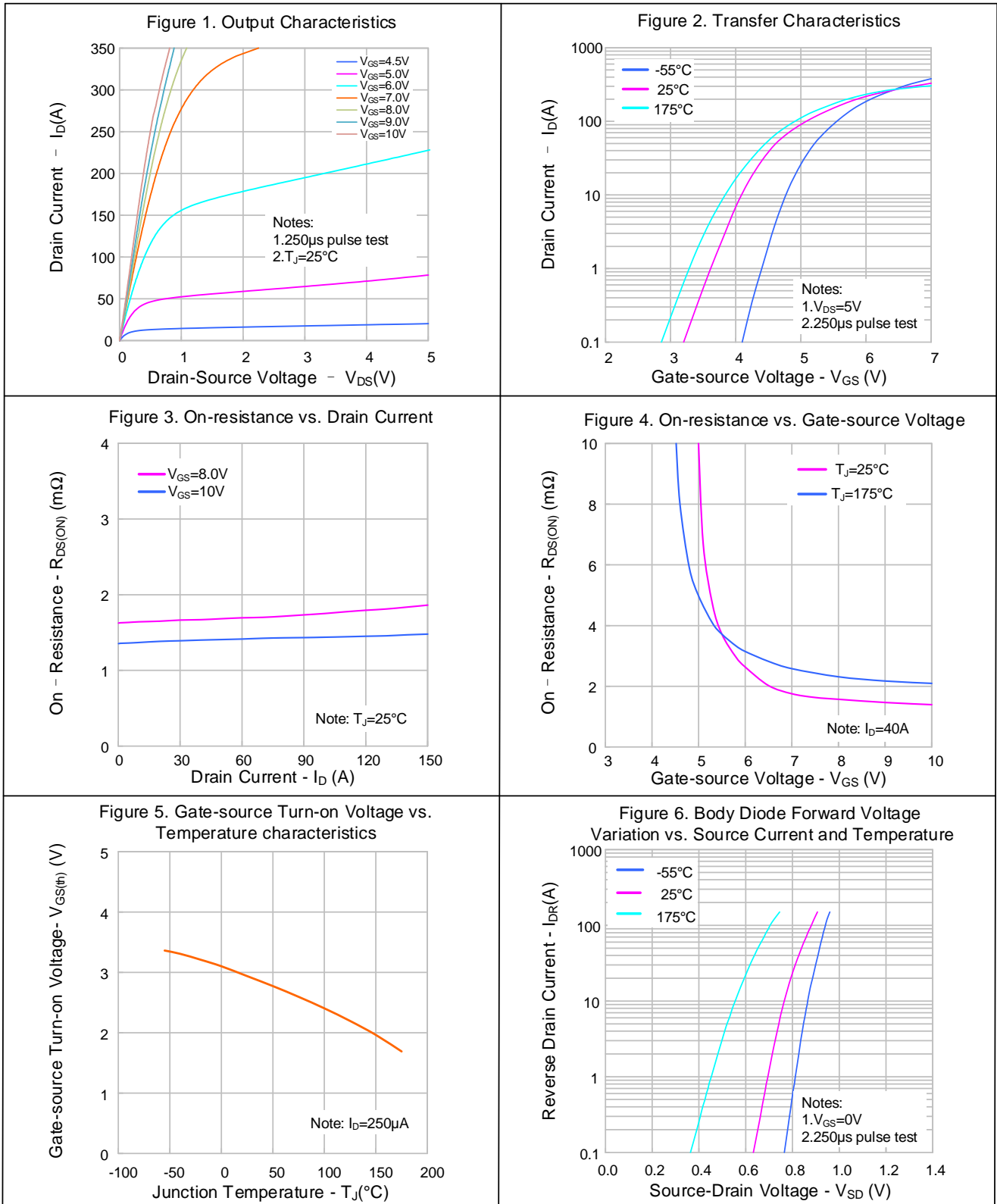
Reverse diode characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Continuous Diode Forward Current	I_S	Integral reverse P-N junction diode in the MOSFET	--	--	160	A
Diode Pulse Current	$I_{S,pulse}$		--	--	640	
Source-Drain Diode Voltage Drop	V_{SD}	$I_S=40A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	T_{rr}	$I_S=25A, V_{GS}=0V, V_R=40V,$	--	59	--	ns
Reverse Recovery Charge	Q_{rr}	$dI_F/dt=100A/\mu s$ (Note 4)	--	87	--	nC

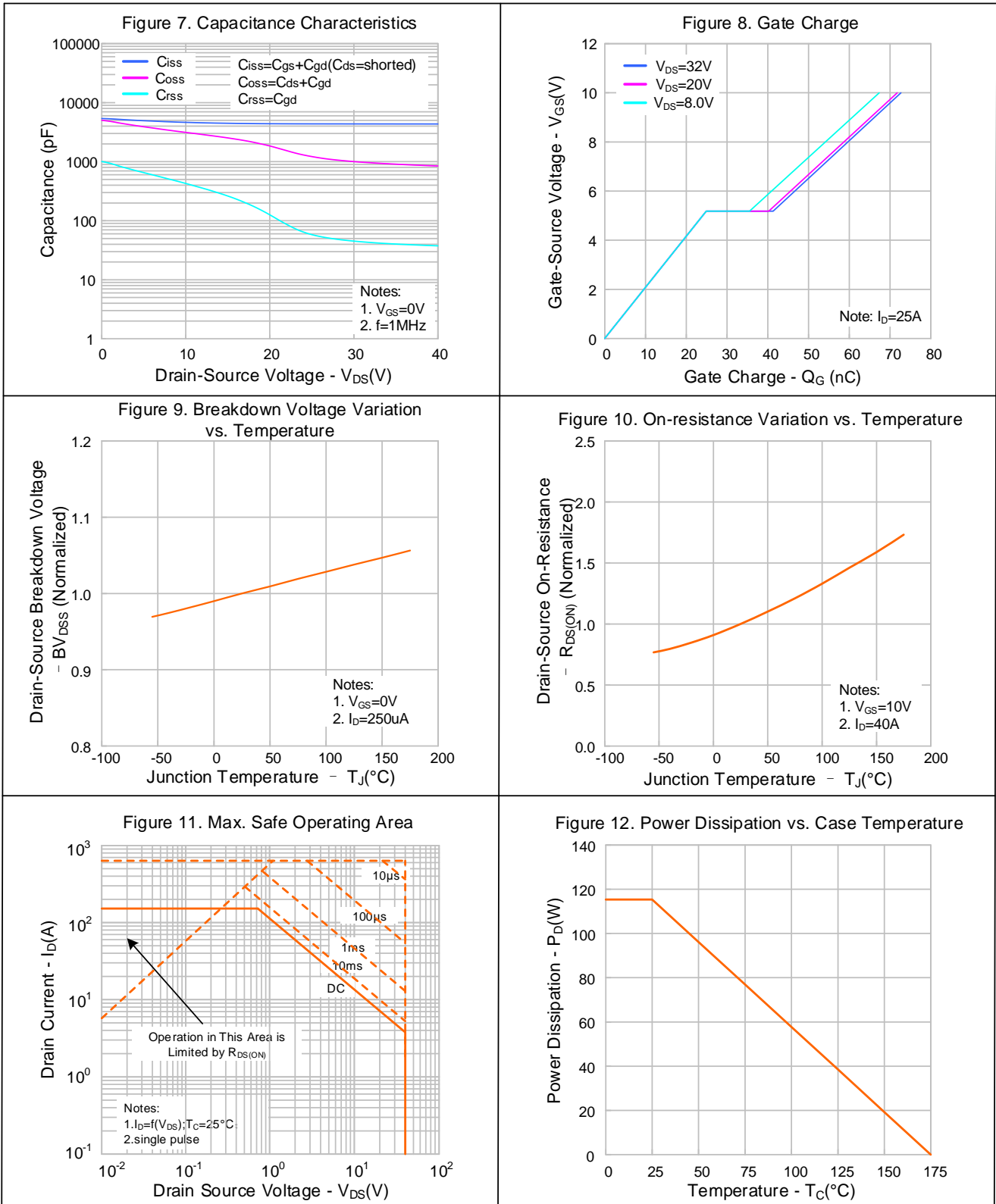
Notes:

- The rated value only refers to the maximum absolute value at the case temperature of 25°C in the specification. If the case temperature is higher than 25°C , it should be derated according to the actual environmental conditions;
- Pulse time $5\mu s$;
- The dissipation power will change with temperature, derating above 25°C : $0.77\text{W}/^\circ\text{C}$;
- Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;
- Essentially independent of operating temperature.

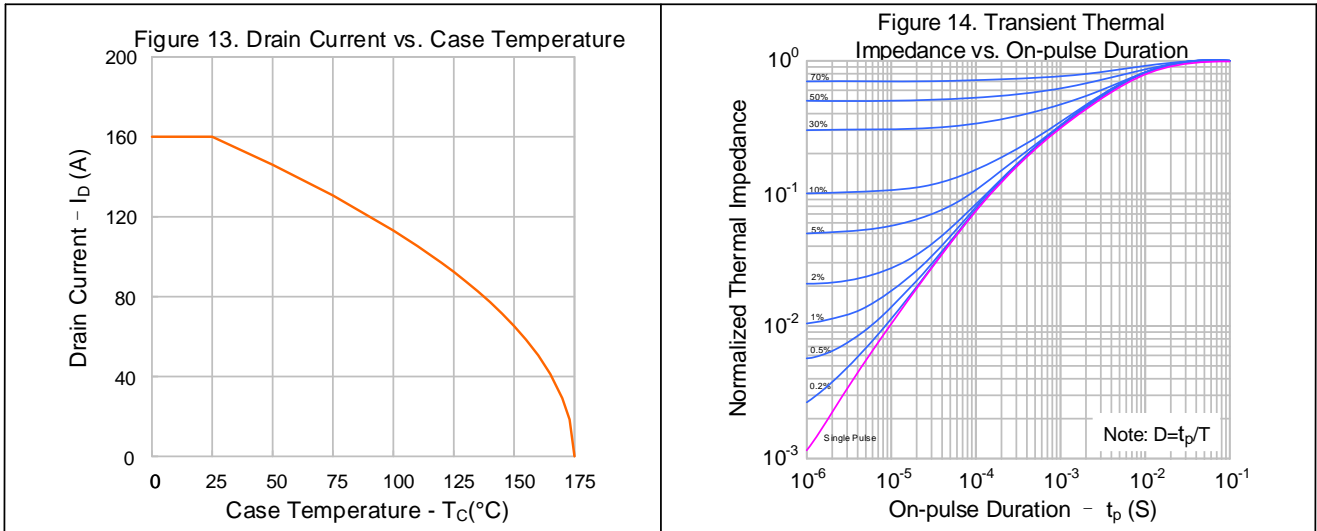
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (CONTINUED)

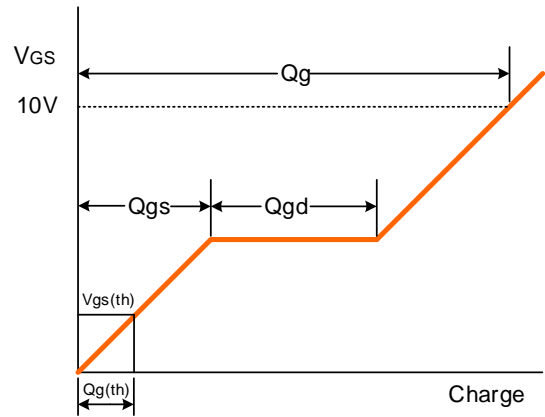
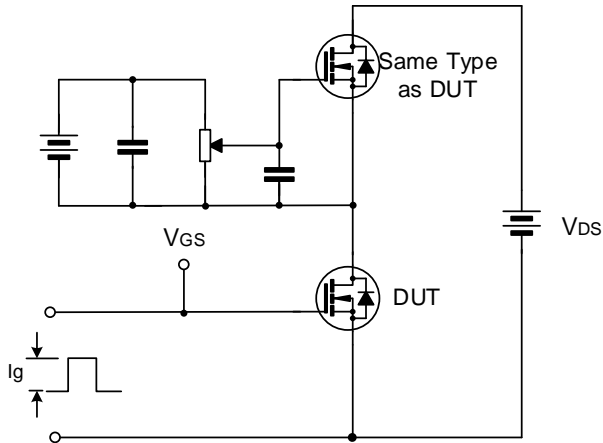


TYPICAL CHARACTERISTICS (CONTINUED)

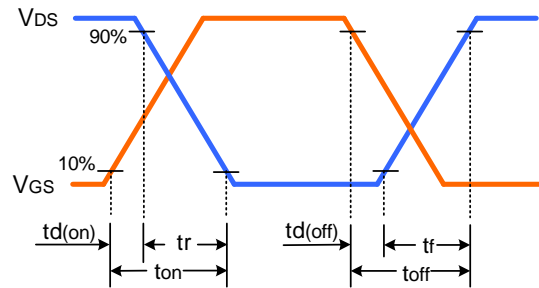
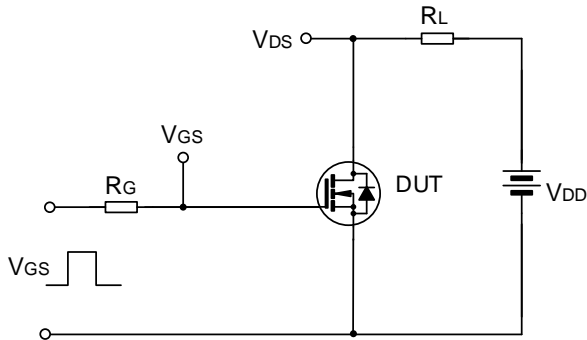


TYPICAL TEST CIRCUIT

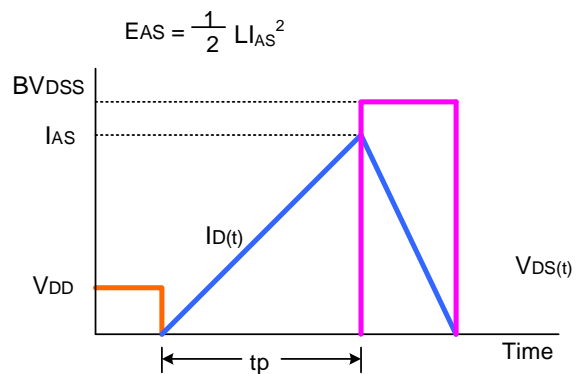
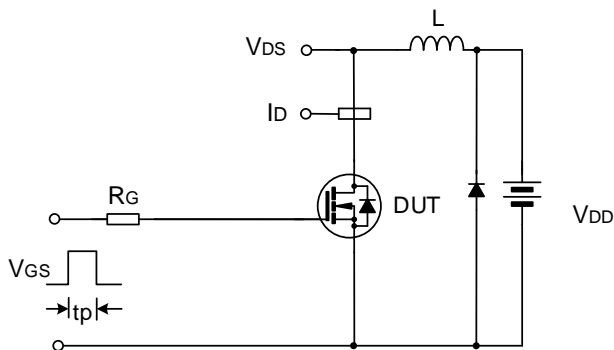
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



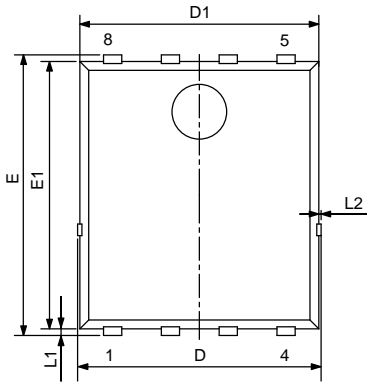
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

PDFN-8Q-5X6X1.1-1.27

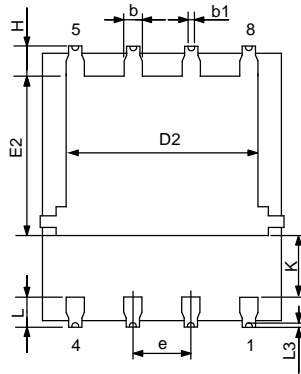
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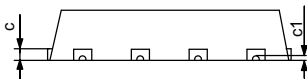
Top View



Side View



Bottom View



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.00	1.10	1.20
b	0.35	0.40	0.55
b1	0.05	—	—
c	0.21	0.25	0.34
c1	0.05	—	—
D	—	—	5.10
D1	4.80	4.90	5.00
D2	4.11	4.21	4.31
e	1.17	1.27	1.37
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.52	3.62	3.72
K	1.10	—	—
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
L2	—	—	0.10
L3	0.03	—	—
H	0.38	0.48	0.58



MOS DEVICES OPERATE NOTES:

Electrostatic charges may exist in many things. Please take following preventive measures to prevent effectively the MOS electric circuit as a result of the damage which is caused by discharge:

- The operator must put on wrist strap which should be earthed to against electrostatic.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed in antistatic/conductive containers for transportation.

Important notice :

1. Silan reserves the right to make changes of this instruction without notice.
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Rev.: **1.3**

Revision History:

1. Update feature description
-

Rev.: **1.2**

Revision History:

1. Modified updated the capacitor condition $V_{DS}=25V$ and the corresponding capacitor value
 2. Update the EAS
-

Rev.: **1.1**

Revision History:

1. Delete the wave soldering condition
 2. Update the typical test circuit
 3. Update the package outline
 4. Update the important notice
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Rev.: **1.0**

Revision History:

1. First release
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