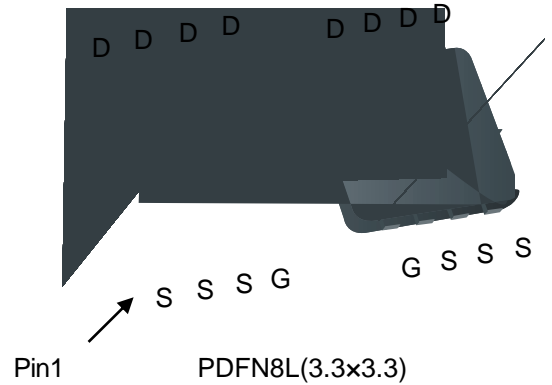


Single N-Channel Enhancement Mode MOSFET

Feature

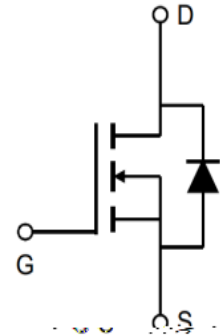
- 40V/50A
 $R_{DS(ON)} = 6.2m$ (typ.) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 9.5m$ (typ.) @ $V_{GS} = 4.5V$
- 100% Avalanche Tested
- Reliable and Rugged
- Halogen Free and Green Devices Available (RoHS Compliant)

Pin Description



Applications

- Power Management for DC/DC
- Switching Application



Single N-Channel MOSFET

Ordering and Marking Information

	<p>Package Code C1: PDFN8L(3.3*3.3)</p> <p>Date Code XYMXXXXXX</p>
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Note: HUAYI lead-free products contain molding compounds/die attach materials and 100% matte tin plate Termination finish; which are fully compliant with RoHS. HUAYI lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J-STD-020 for MSL classification at lead-free peak reflow temperature. HUAYI defines Green to mean lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

HUAYI reserves the right to make changes, corrections, enhancements, modifications, and improvements to this product and/or to this document at any time without notice.

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V _{DSS}	Drain-Source Voltage	40	V	
V _{GSS}	Gate-Source Voltage	±20	V	
T _J	Maximum Junction Temperature	-55 to 175	°C	
T _{STG}	Storage Temperature Range	-55 to 175	°C	
I _S	Source Current-Continuous(Body Diode)	Tc=25°C	50	A
Mounted on Large Heat Sink				
I _{DM}	Pulsed Drain Current *	Tc=25°C	200	A
I _D	Continuous Drain Current	Tc=25°C	50	A
		Tc=100°C	30	A
P _D	Maximum Power Dissipation	Tc=25°C	34	W
		Tc=100°C	11.6	W
R _{θJC}	Thermal Resistance, Junction-to-Case		4.3	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient **		60	°C/W
E _{AS}	SinglePulsed-Avalanche Energy ***	L=0.3mH	50	mJ

Note: * Repetitive rating pulse width limited by max.junction temperature.
 ** Surface mounted on 1in2 FR-4 board.
 *** Limited by T_{Jmax}, starting T_J=25°C, L = 0.3mH, R_θ= 4, V_{GS}=10V.

Electrical Characteristics(Tc =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG090N04LS1			Unit
			Min	Typ.	Max	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250 A	40	-		V
I _{DSS}	Drain-to-Source Leakage Current	V _{DS} =40V, V _{GS} =0V	-	-	1	A
		T _J =125°C	-	-	50	A
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250 A	1	2.1	3	V
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)*}	Drain-Source On-State Resistance	V _{GS} =10V, I _{DS} =20A		6.2	7.5	m
		V _{GS} =4.5V, I _{DS} =20A		9.5	13	m
Diode Characteristics						
V _{SD*}	Diode Forward Voltage	I _{SD} =20A, V _{GS} =0V	-	0.91	1.2	V
t _{rr}	Reverse Recovery Time	I _{SD} =20A, dI _{SD} /dt=100A/	-	10.9	-	ns
Q _{rr}	Reverse Recovery Charge	s	-	4.1	-	nC

Electrical Characteristics (Cont.) (Tc =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG090N04LS1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Frequency=500KHz	-	2.1	-	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, Frequency=500KHz	-	798	-	pF
C _{oss}	Output Capacitance		-	164	-	
C _{rss}	Reverse Transfer Capacitance		-	12.5	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =10V, R _G =4 I _{DS} =20A, V _{GS} =10V	-	7.3	-	ns
T _r	Turn-on Rise Time		-	21.8	-	
t _{d(OFF)}	Turn-off Delay Time		-			

Typical Operating Characteristics

Figure 1: Power Dissipation

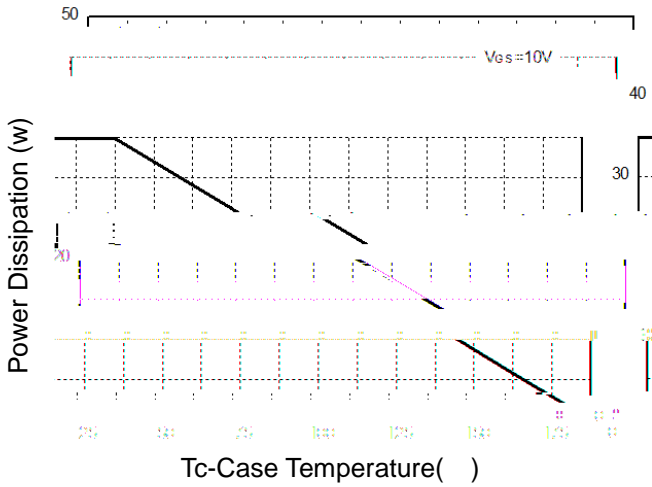


Figure 2: Drain Current

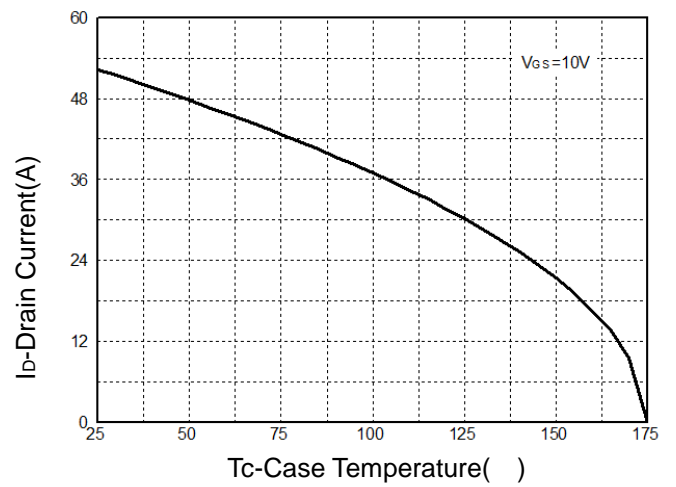


Figure 3: Safe Operation Area

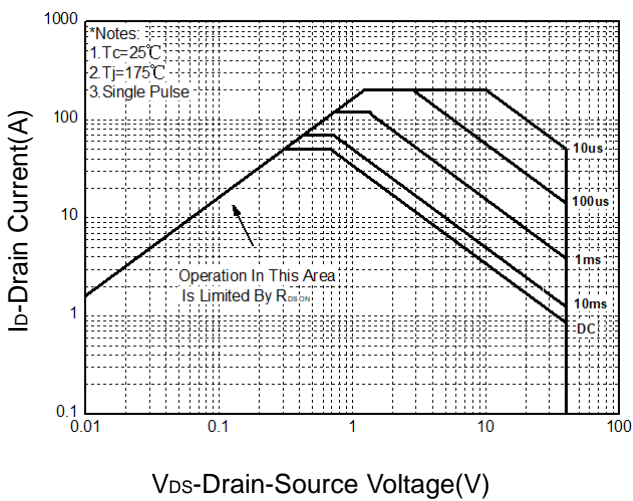


Figure 4: Thermal Transient Impedance

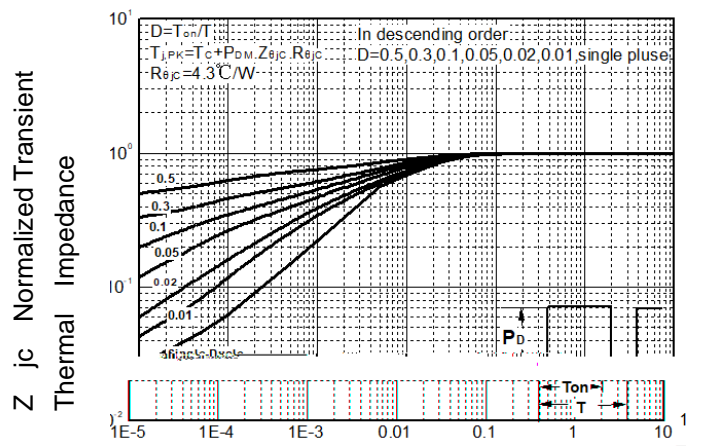


Figure 5: Output Characteristics

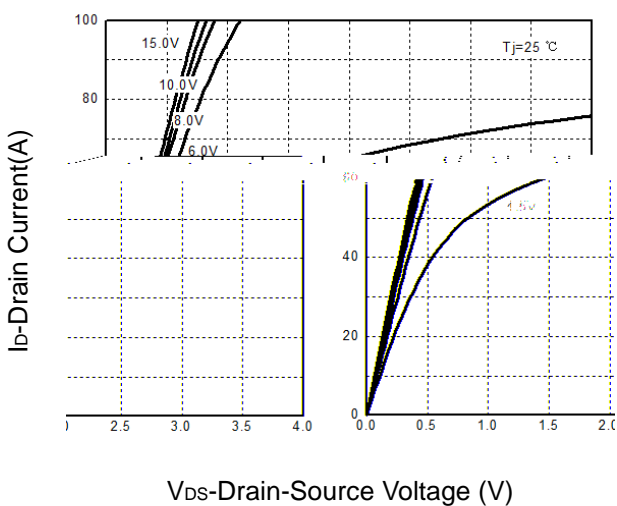
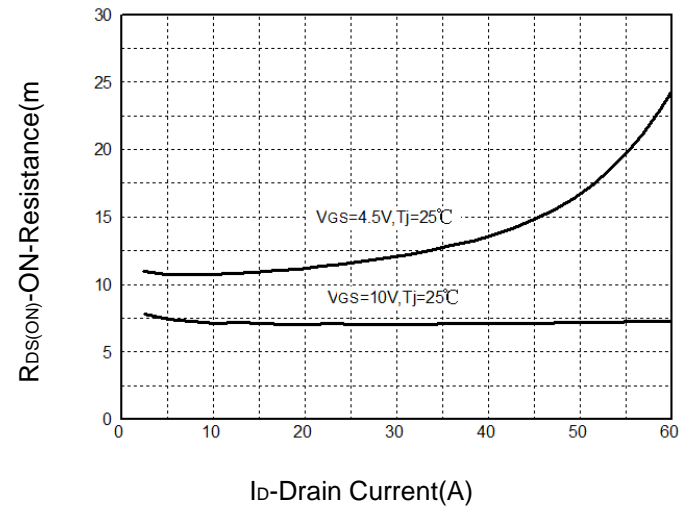


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

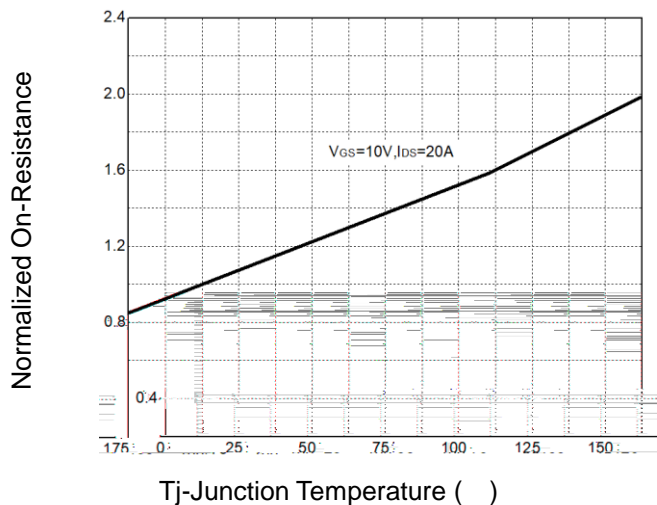


Figure 8: Source-Drain Diode Forward

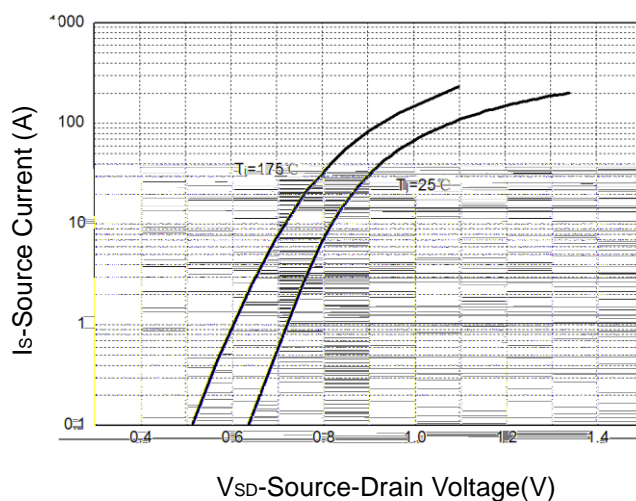


Figure 9: Capacitance Characteristics

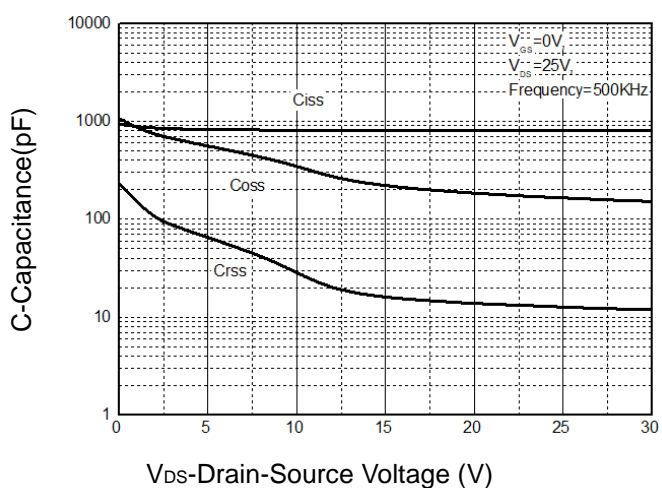
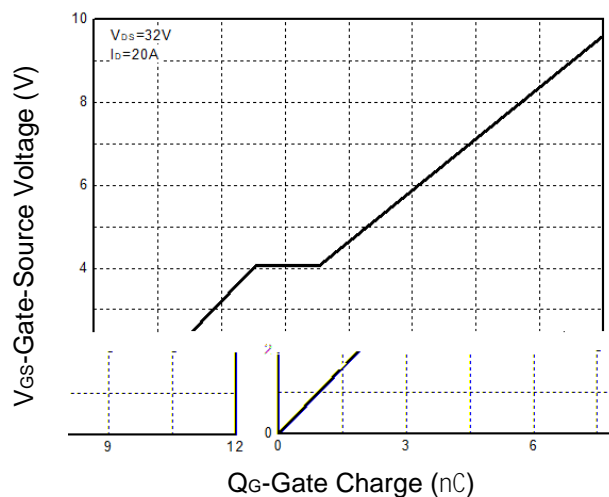
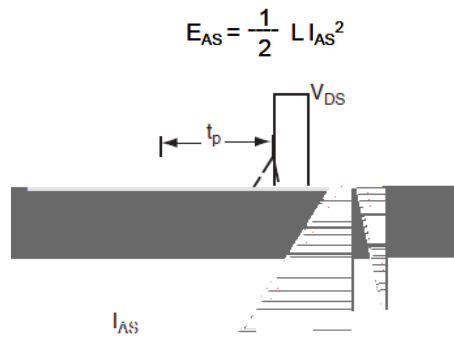
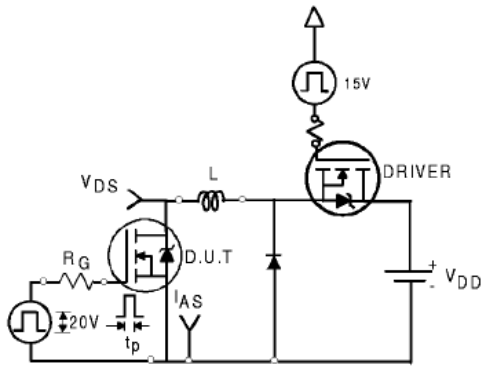


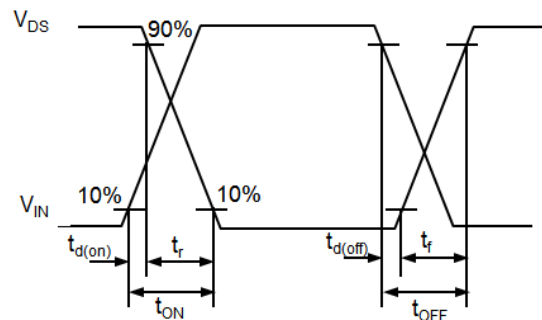
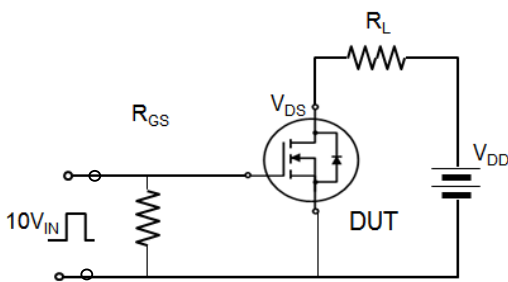
Figure 10: Gate Charge Characteristics



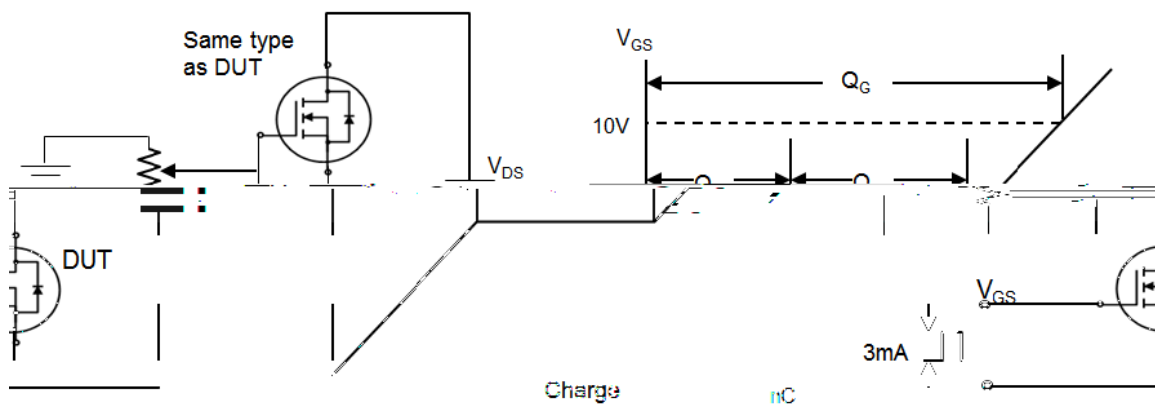
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit



HYG090N04LS1C1

Device Per Unit

Package Type

Unit

Quantity

Classification Profile

Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{smin})	100 °C	
Temperature max (T_{smax})	150 °C	
Time (T_{smin} to T_{smax}) (t_s)	60-120 s	16958 184.61 6:

Table 1.SnPb Eutectic Process Classification Temperatures (Tc)

Package Thickness	Volume mm ³	Volume mm ³
	<350	350
2.5 mm	235 °C	220 °C
	220 °C	220 °C

Table 2.Pb-free Process Classification Temperatures (Tc)

Package Thickness	Volume mm ³	Volume mm ³	Volume mm ³
	<350	350-2000	2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm 2.5 mm	260 °C	250 °C	245 °C
2.5 mm	250 °C	245 °C	245 °C

Reliability Test Program

Test item	Method	Description
SOLDERABILITY	JESD-22, B102	5 Sec, 245
HTRB	JESD-22, A108	168/500/1000Hrs, Bias @ 150
HTGB	JESD-22, A108	168 /500/1000Hrs, Vgs100% @ 150°C
PCT	JESD-22, A102	96 Hrs, 100%RH, 2atm, 121
TCT	JESD-22, A104	500 Cycles, -55 ~150

Customer Service

Worldwide Sales and Service: sales@hymexa.com

Technical Support: Technology@hymexa.com

Xi'an Huayi Microelectronics Co., Ltd.

No.8928,Shangji Road,Economic and Technological Development Zone,Xi'an,China

TEL: (86-029) 86685706

FAX: (86-029) 86685705

E-mail: sales@hymexa.com

Web net: www.hymexa.com