

P-Channel Enhancement Mode MOSFET

Feature

- -40V/-8.5A
R_{DS(ON)}= 17 mΩ(typ.) @V_{GS} = -10V
R_{DS(ON)}= 26 mΩ(typ.) @V_{GS} = -4.5V
- 100% Avalanche Tested
- Reliable and Rugged
- Halogen Free and Green Devices Available
(RoHS Compliant)

Pin Description

SOP8L

Applications

- Switching application
- Li-battery protection
- DC-DC
- Motor control

Single P-Channel MOSFET

Ordering and Marking Information

S HYG190P04 XYMXXXXXX	Package Code S:SOP8L Date Code XYMXXXXXX
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Note: HUAYI halogen free products contain molding compounds/die attach materials and 100% matte tin plate Termination finish; which are fully compliant with RoHS. HUAYI halogen free products meet or exceed the halogen free requirements of IPC/JEDEC J-STD-020 for MSL classification at halogen free peak reflow temperature. HUAYI defines "Green" to mean halogen 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	Junction Temperature Range	-55 to 175	°C	
T _{STG}	Storage Temperature Range		°C	
I _S	Source Current-Continuous(Body Diode)	Tc=25°C	-8.5	A
Mounted on Large Heat Sink				
I _{DM}	Pulsed Drain Current *	Tc=25°C	-25.5	A
I _D	Continuous Drain Current	Tc=25°C	-8.5	A
		Tc=100°C	-6.0	A
P _D	Maximum Power Dissipation	Tc=25°C	3	W
		Tc=100°C	1.5	W
R _{JA}	Thermal Resistance, Junction-to-Ambient **		50	°C/W
E _{AS}	Single Pulsed-Avalanche Energy ***	L=0.3mH	66	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_G= 25 , V_{GS}=-10V.

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

Symbol	Parameter	Test Conditions	HYG190P04LQ1			Unit
			Min	Typ.	Max	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-40	-	-	V
I _{DSS}	Drain-to-Source Leakage Current	V _{DS} =-40V, V _{GS} =0V	-	-	-1	μA
		T _J =125°C	-	-	-50	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	-1	-1.5	-2.0	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} =-10A	-	17	21	m
		V _{GS} =-4.5V, I _{DS} =-10A		26	31	m
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _{SD} =-10A, V _{GS} =0V	-	-0.86	-1.2	V
t _{rr}	Reverse Recovery Time	I _{SD} =-10A, dI _{SD} /dt=-100A/μs	-	11.2	-	ns

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

Symbol	Parameter	Test Conditions	HYG190P04LQ1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=500KHz	-	5.4	-	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-25V, Frequency=500KHz	-	1090	-	pF
C _{oss}	Output Capacitance		-	138	-	
C _{rss}	Reverse Transfer Capacitance		-	121	-	

Typical Operating Characteristics

Figure 1: Power Dissipation

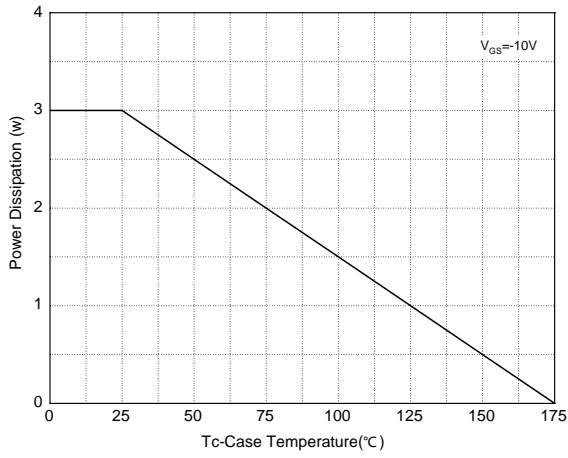


Figure 2: Drain Current

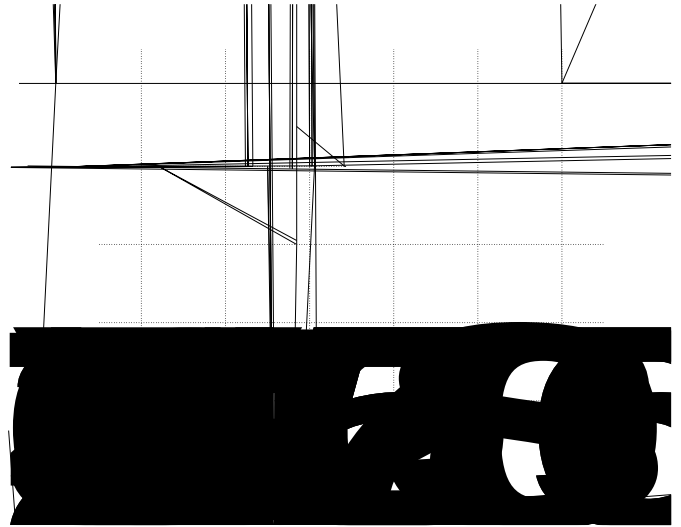


Figure 3: Safe Operation Area

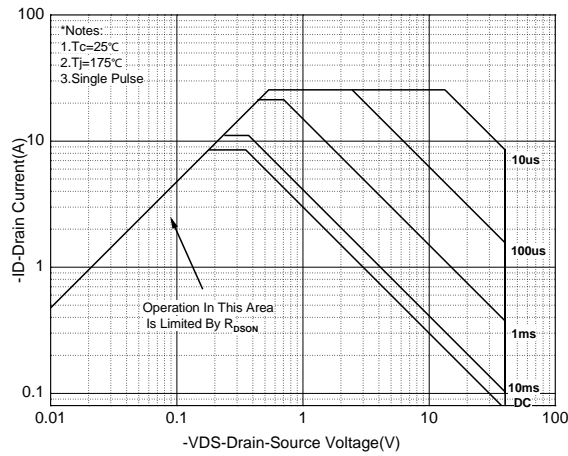


Figure 4: Thermal Transient Impedance



Figure 5: Output Characteristics

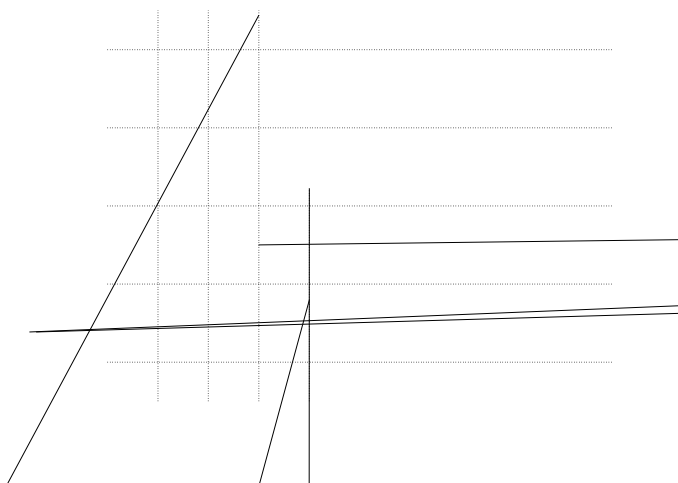
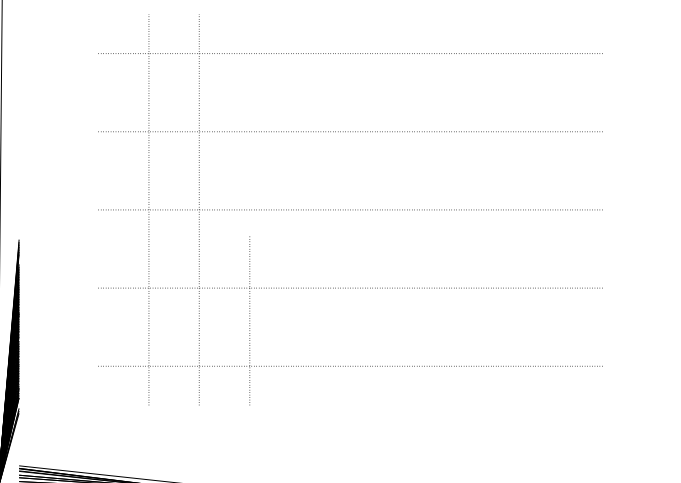
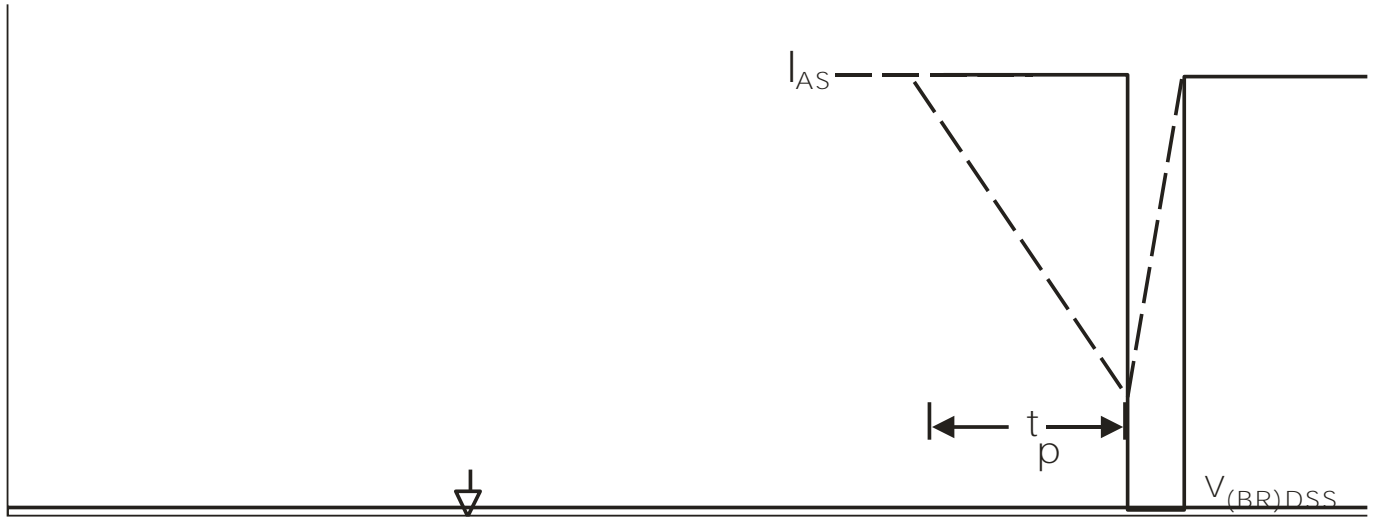


Figure 6: Drain-Source On Resistance

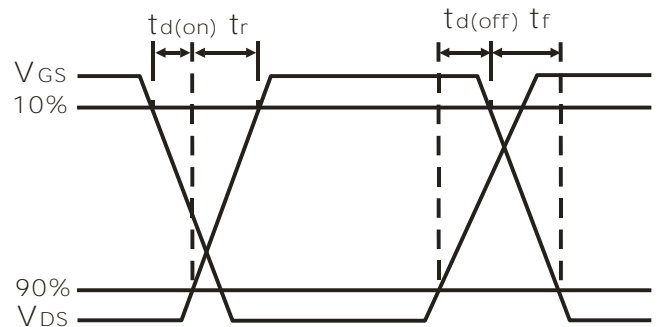
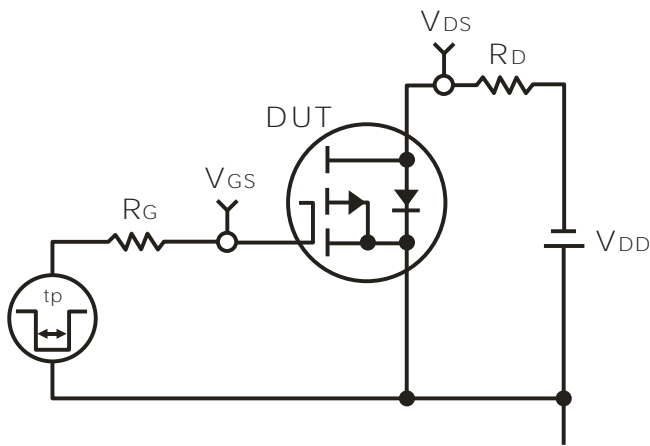


Typical Operating Characteristics(Cont.)

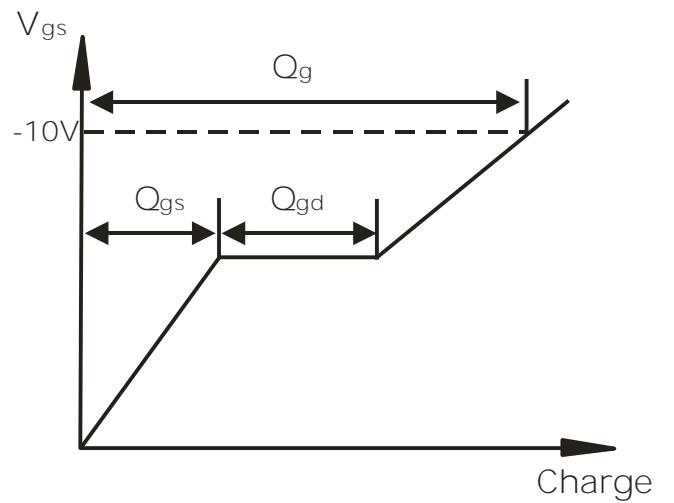
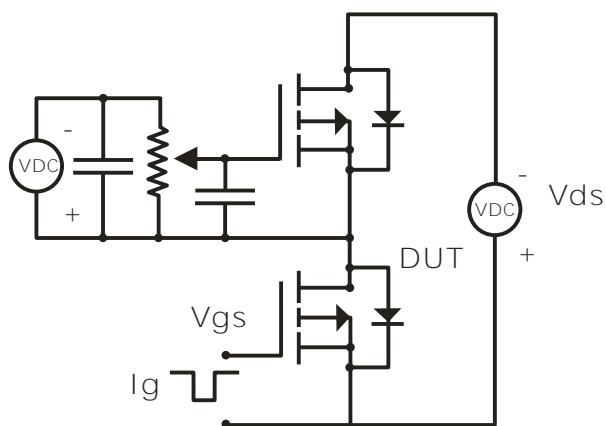
Avalanche Test Circuit



Switching Time Test Circuit



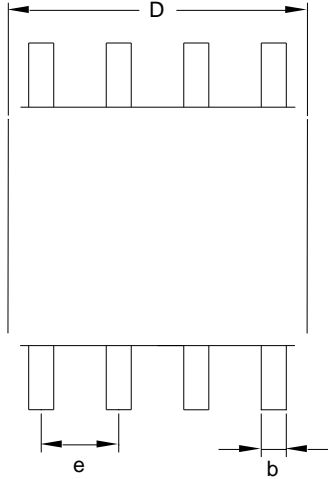
Gate Charge Test Circuit



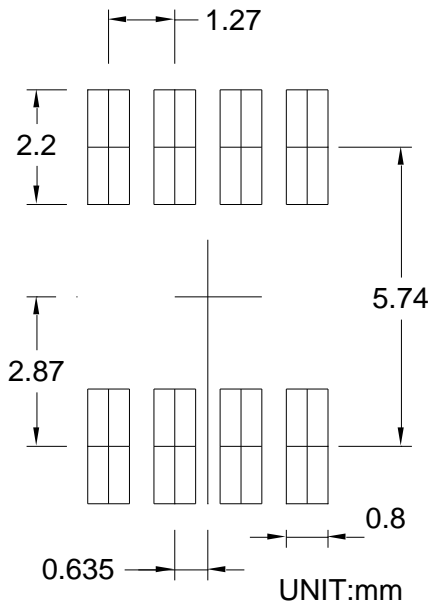
Device Per Unit

Package Type	Unit	Quantity
SOP8L	Reel	2500

Package Information



RECOMMENDED LAND PATTERN



Note:

1. Follow JEDEC MS-012AA.
2. Dimension D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.
3. Dimension E" does not include inter-lead flash or protrusions. Inter-lead flash and protrusions shall not exceed 10 mil per side.

COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	-	-	1.75
A1	0.10	-	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	-	0.47
c	0.20	-	0.24
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
h	0.25	-	0.50
L	0.50	-	0.80
L1	1.05 REF		
θ	0°	-	8°

Carrier Tape & Reel Dimensions

Application	A	H	T1	C	d	D	W	E1	F
SOP8L	330 2.00	50 MIN	12.4+2.00 -0.20	13.0+0.50 -0.20	1.5 MIN	20.2 MIN	12.0 0.30	1.75 0.10	5.5 0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0

Table 1.SnPb Eutectic Process – Classification Temperatures (Tc)

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

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

Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ ≥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°C
HTRB	JESD-22, A108	168/500 Hrs, Bias @ 150°C
HTGB	JESD-22, A108	168 /500 Hrs, V _{gs} 100% @ 150°C
PCT	JESD-22, A102	96 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	250/500 Cycles, -55°C~150°C

Customer Service

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