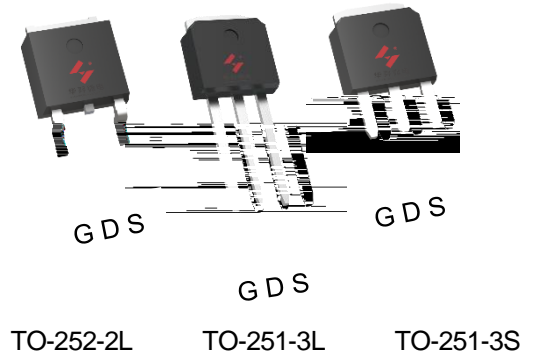


P-Channel Enhancement Mode MOSFET

Feature

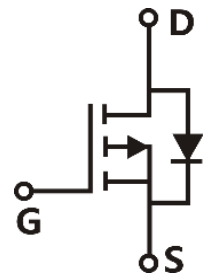
- -40V/-38A
- $R_{DS(ON)} = 17$ @ $V_{GS} = -10V$
- $R_{DS(ON)} = 27$ @ $V_{GS} = -4.5V$
- 100% Avalanche Tested
- 100% DVDS
- Reliable and Rugged
- Halogen Free and Green Devices Available
(RoHS Compliant)

Pin Description



Applications

- Switching application
- Li-battery protection
- Motor control



Single P-Channel MOSFET

Ordering and Marking Information

<table style="width: 100%; text-align: center;"> <tr> <td style="width: 33%;">■ D</td> <td style="width: 33%;">■ U</td> <td style="width: 33%;">■ V</td> </tr> <tr> <td>HYG190P04</td> <td>HYG190P04</td> <td>HYG190P04</td> </tr> <tr> <td>XYMXXXXXX</td> <td>XYMXXXXXX</td> <td>XYMXXXXXX</td> </tr> </table>	■ D	■ U	■ V	HYG190P04	HYG190P04	HYG190P04	XYMXXXXXX	XYMXXXXXX	XYMXXXXXX	<p>Package Code D: TO-252-2L U: TO-251-3L V: TO-251-3S</p> <p>Date Code XYMXXXXXX</p>
■ D	■ U	■ V								
HYG190P04	HYG190P04	HYG190P04								
XYMXXXXXX	XYMXXXXXX	XYMXXXXXX								

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	-38	A
Mounted on Large Heat Sink				
I _{DM}	Pulsed Drain Current *	Tc=25°C	-152	A
I _D	Continuous Drain Current	Tc=25°C	-38	A
		Tc=100°C	-27	A
P _D	Maximum Power Dissipation	Tc=25°C	62	W
		Tc=100°C	30	W
R _{θJC}	Thermal Resistance, Junction-to-Case		2.4	°C/W

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=1MHz	-	5.5	-	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-25V, Frequency=1MHz	-	1070	-	pF
C _{oss}	Output Capacitance		-	133	-	
C _{rss}	Reverse Transfer Capacitance		-	122	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-20V, R _G =4	-	7.9	-	ns
T _r	Turn-on Rise Time		-	48.9	-	
t _{d(OFF)}	Turn-off Delay Time	V _{DD} =-20V, R _G =4 I _{DS} =-20A, V _{GS} =-10V	0.47	4.8	15.62	ns

Typical Operating Characteristics

Figure 1: Power Dissipation

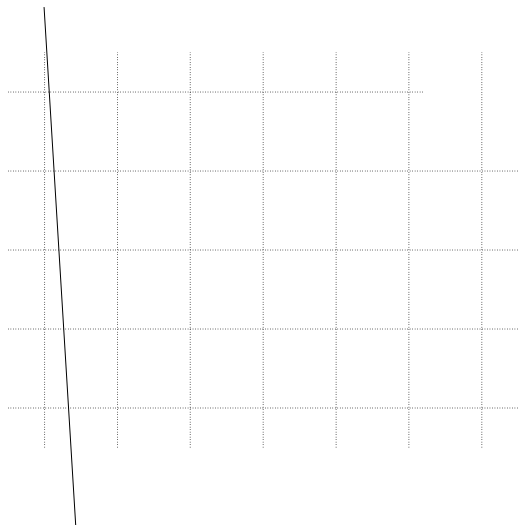


Figure 2: Drain Current



Figure 3: Safe Operation Area

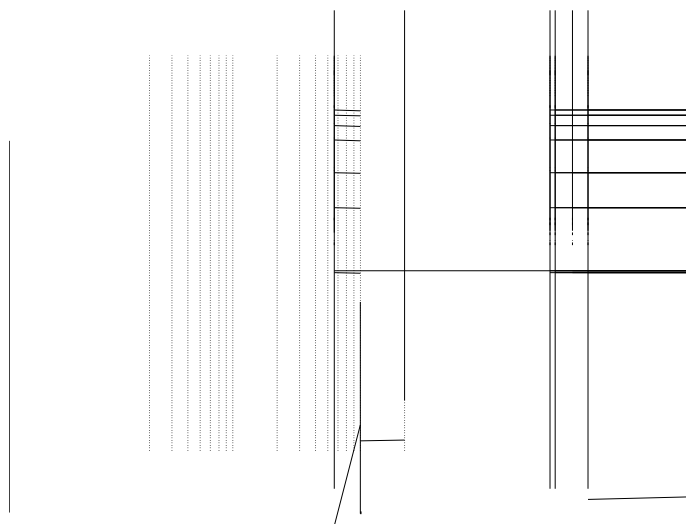


Figure 4: Thermal Transient Impedance

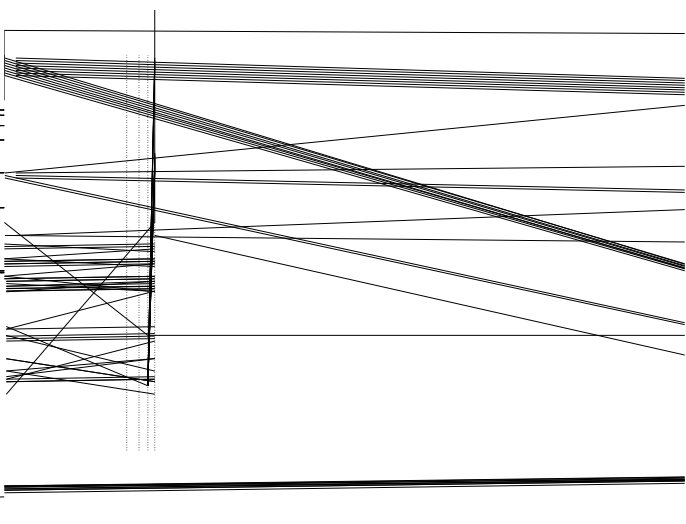


Figure 5: Output Characteristics

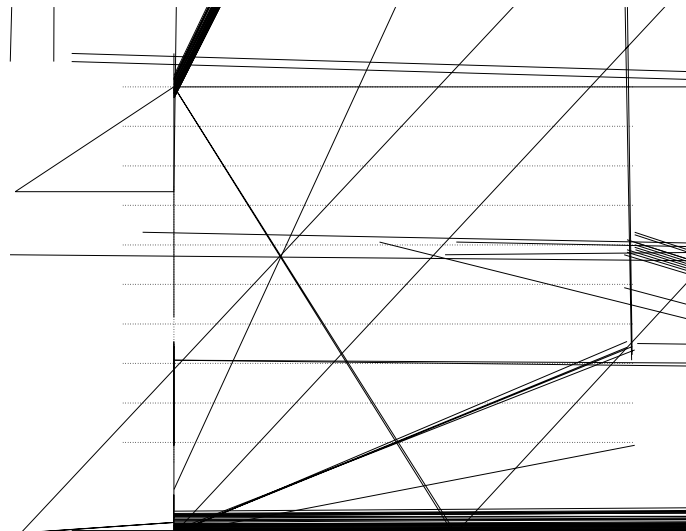
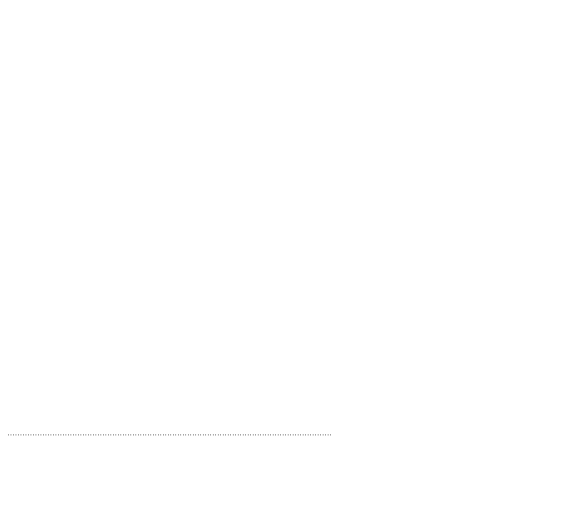
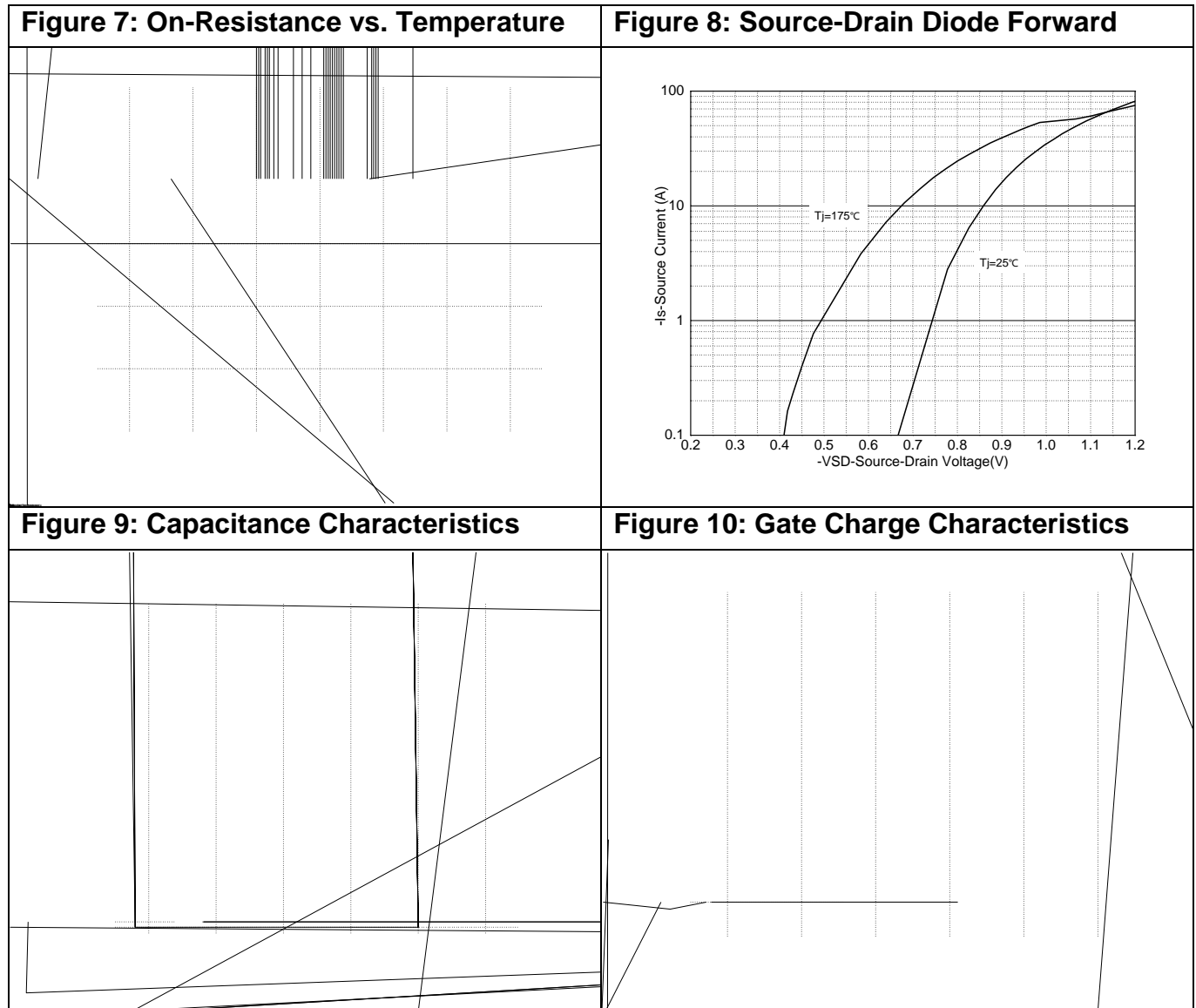


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)



Device Per Unit

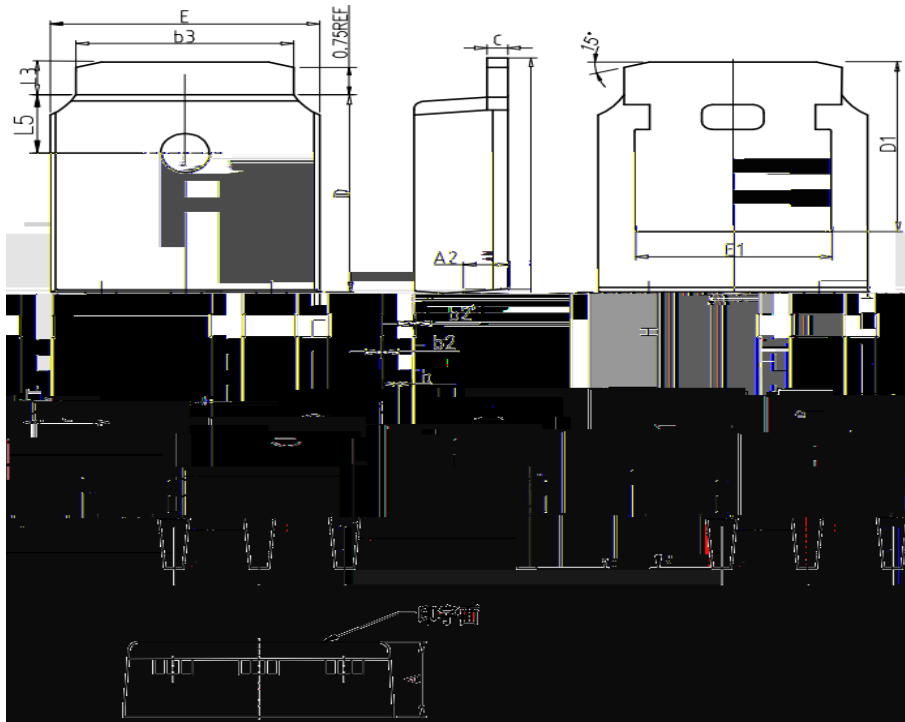
Package Type	Unit	Quantity
TO-252-2L	Tube	75
TO-252-2L	Reel	2500
TO-251-3L	Tube	75
TO-251-3S	Tube	75

Package Information

TO-252-2L

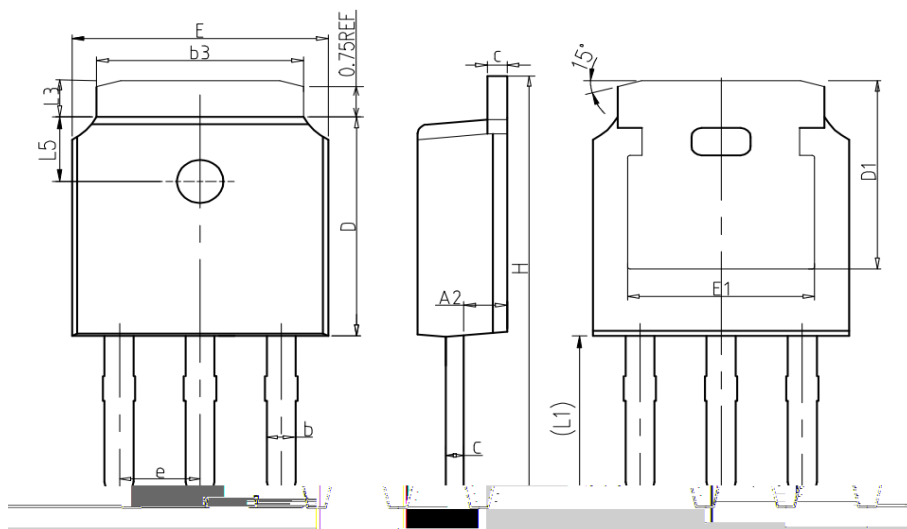
COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX

TO-251-3L

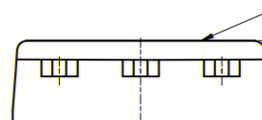


COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b2	0.00	0.04	0.10
b2'	0.00	0.04	0.10
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.286BSC		
H	16.22	16.52	16.82
L1	9.15	9.40	9.65
L3	0.88	1.02	1.28
L5	1.65	1.80	1.95

TO-251-3S

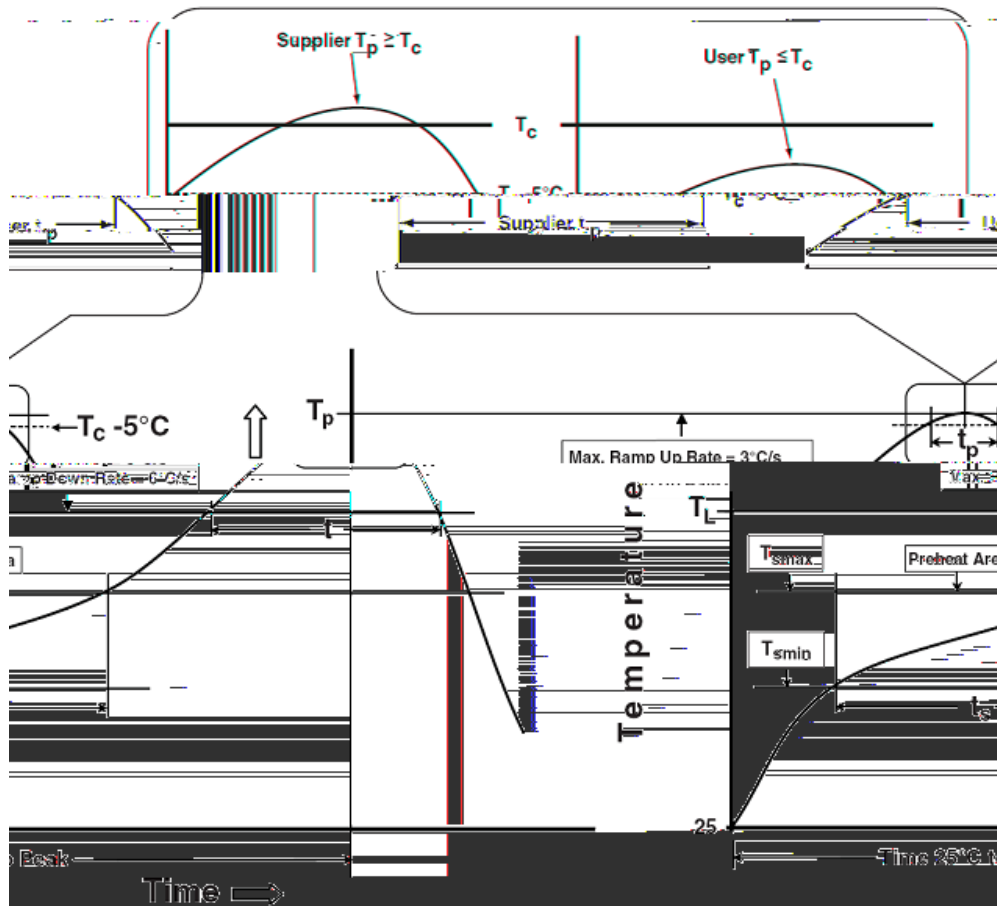


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COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.286BSC		
H	10.00	11.22	11.44
L1	3.90	4.10	4.30
L3	0.88	1.02	1.28
L5	1.65	1.80	1.95

Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{smin})	100 °C	150 °C
Temperature max (T_{smax})	150 °C	200 °C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T_{smax} to T_P)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time at liquidous (t_L)	60-150 seconds	60-150 seconds
Peak package body Temperature (T_P)*	See Classification Temp in table 1	See Classification Temp in table 2
Time (t_P)** within 5°C of the specified classification temperature (T_C)	20** seconds	30** seconds
Average ramp-down rate (T_P to T_{smax})	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.
*Tolerance for peak profile Temperature (T_P) is defined as a supplier minimum and a user maximum.		
** Tolerance for time at peak profile temperature (t_P) is defined as a supplier minimum and a user maximum.		

HYG190P04LQ1D/U/V