

30V Complementary MOSFET

Feature

N- Channel

V_{ds} = 30V

29 A (V_{gs}= 10V)

9.0 mΩ (V_{gs}= 10V)

13.5 mΩ (V_{gs}= 4.5V)

- 100% Avalanche Tested
- Reliable and Rugged
- Halogen Free and Green Devices Available (RoHS Compliant)

P - Channel

V_{ds} = -30V

-17 A (V_{gs}= -10V)

21 mΩ (V_{gs}= -10V)

43 mΩ (V_{gs}= -4.5V)

Pin Description

Applications

- Synchronous Rectifiers
- Wireless Power
- H-bridge Motor Drive

Ordering and Marking Information

HYG110C03LR1D4

Absolute Maximum Ratings

Symbol	Parameter	N- Channel	P- Channel	Unit
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Common Ratings (Tc=25°C Unless Otherwise Noted)

N-Mosfet Electrical Characteristics (T_c =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG110C03LR1			Unit
			Min	Typ.	Max	
Static Characteristics						
B _{VDS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250 A	30	-		V
I _{DSS}	Drain-to-Source Leakage Current	V _{DS} =30V, 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	1.7	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} =10A	-	9.0	12	m
		V _{GS} =4.5V, I _{DS} =5A		13.5	17	
Diode Characteristics						
V _{SD*}	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.76	1.0	V
t _{rr}	Reverse Recovery Time	I _{SD} =6A, dI _{SD} /dt=100A/	-	6.5	-	ns
Q _{rr}	Reverse Recovery Charge		-	4.0	-	nC

N-Mosfet Electrical Characteristics (Cont.) (T_c =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG110C03LR1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Frequency=1.0MHz	-	1.8	-	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz	-	762	-	pF
C _{oss}	Output Capacitance		-	114	-	
C _{rss}	Reverse Transfer Capacitance		-	90	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =10V, R _G =4 I _{DS} =6A, V _{GS} =10V	-	6.8	-	ns
T _r	Turn-on Rise Time		-	30	-	
t _{d(OFF)}	Turn-off Delay Time		-	17	-	
T _f	Turn-off Fall Time		-	6	-	
Gate Charge Characteristics						
Q _g	Total Gate Charge(V _{GS} =10V)	V _{DS} =15V, V _{GS} =10V, I _D =8A	-	15.9	-	nC
Q _g	Total Gate Charge(V _{GS} =4.5V)		-	8.5	-	
Q _{gs}	Gate-Source Charge		-	3.0	-	
Q _{gd}	Gate-Drain Charge		-	3.4	-	

Note: *Pulse test pulse width 300us duty cycle 2%

N-Mosfet Typical Operating Characteristics

Figure 1: Power Dissipation

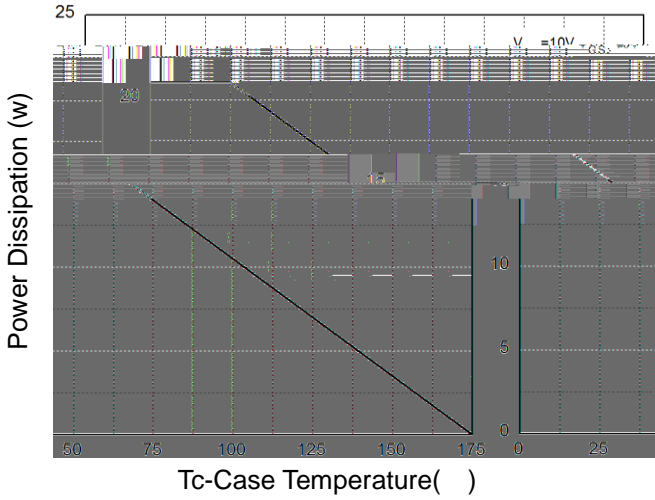


Figure 2: Drain Current

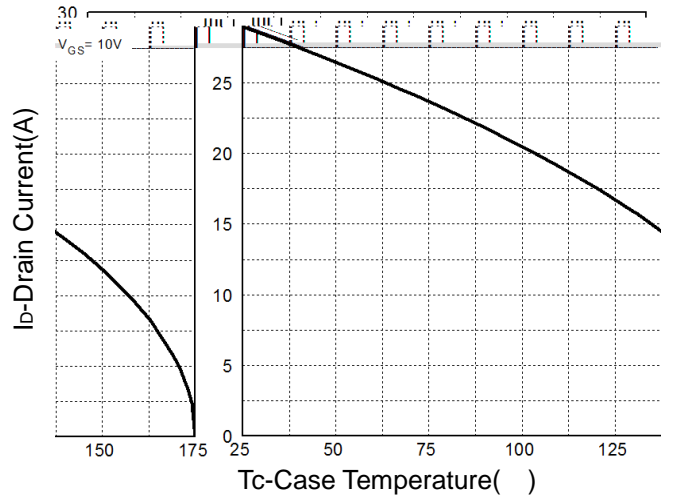


Figure 3: Safe Operation Area

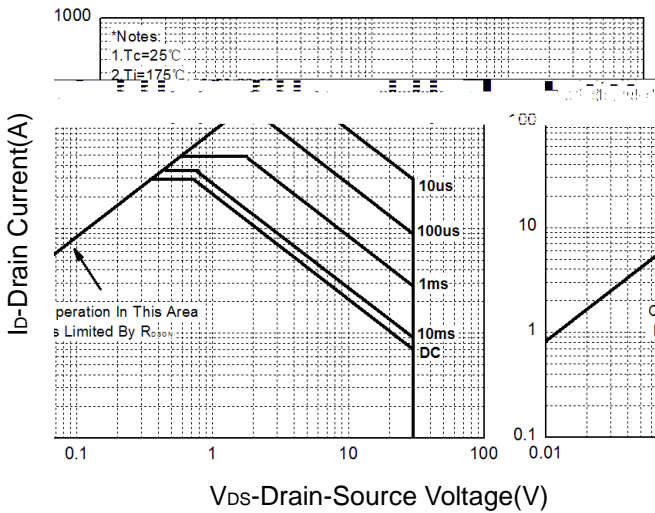


Figure 4: Thermal Transient Impedance

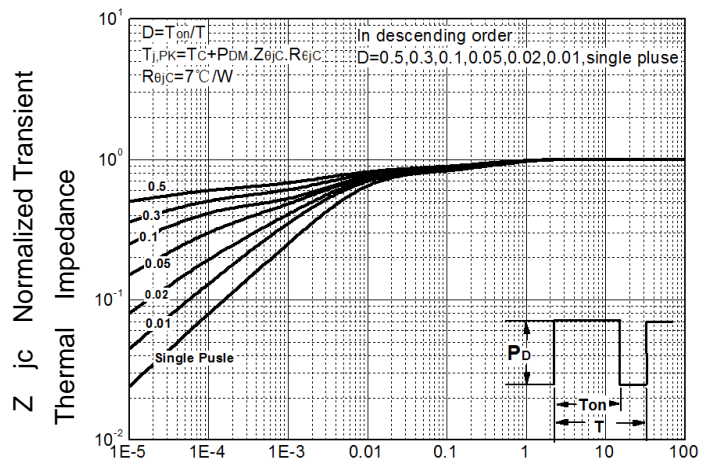


Figure 5: Output Characteristics

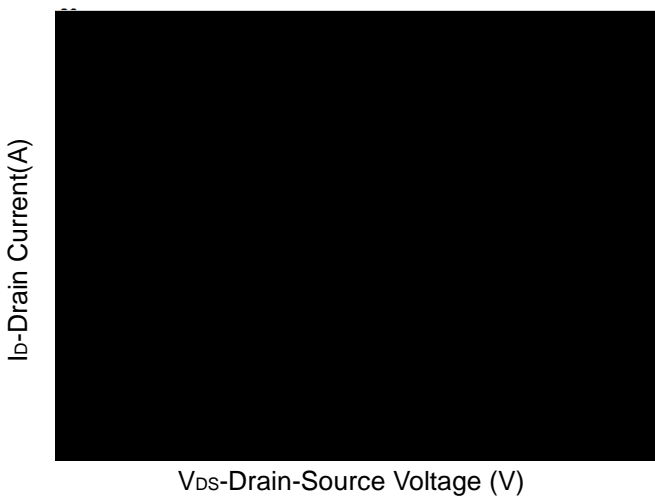
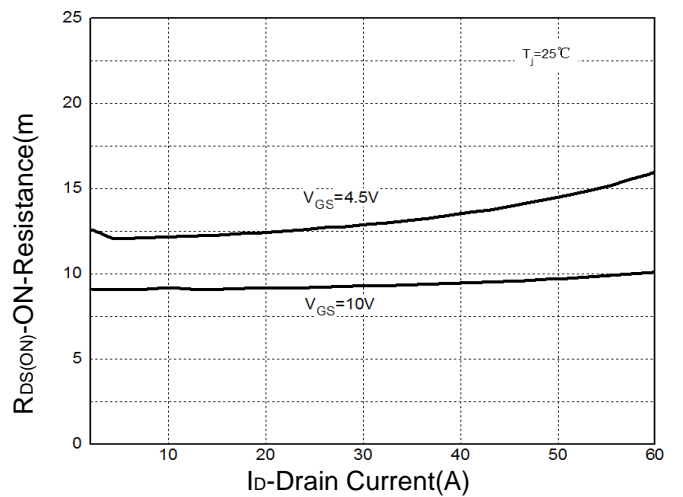


Figure 6: Drain-Source On Resistance



N-Mosfet Typical Operating Characteristics

Figure 7: On-Resistance vs. Temperature

Figure 8: Source-Drain Diode Forward

Normal

T_j -Junction Temperature ()

V_{SD} -Source-Drain Voltage(V)

Figure 9: Capacitance Characteristics

Figure 10: Gate Charge Characteristics

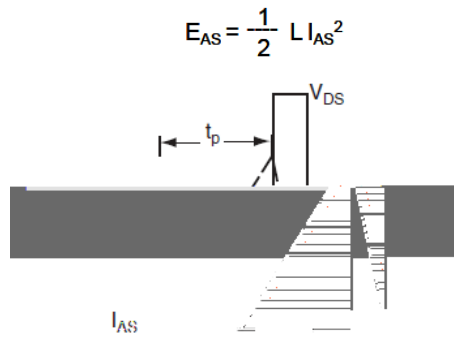
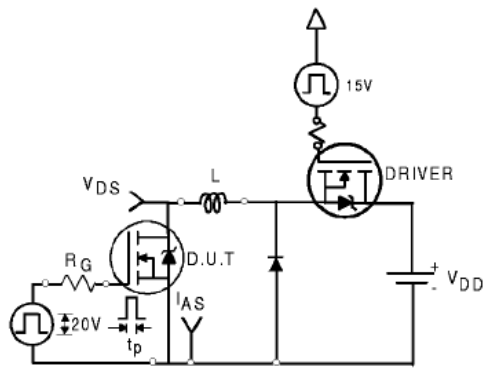
V_{DS} -Drain-Source Voltage (V)

V_{GS} -Gate-Source Voltage (V)

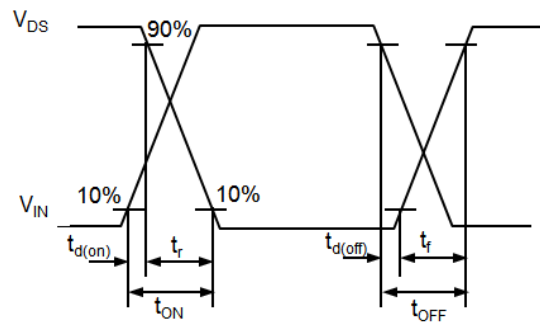
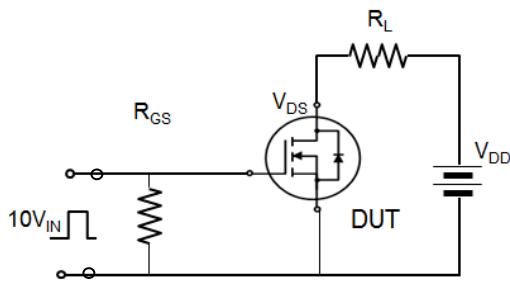
Q_G -Gate Charge ()

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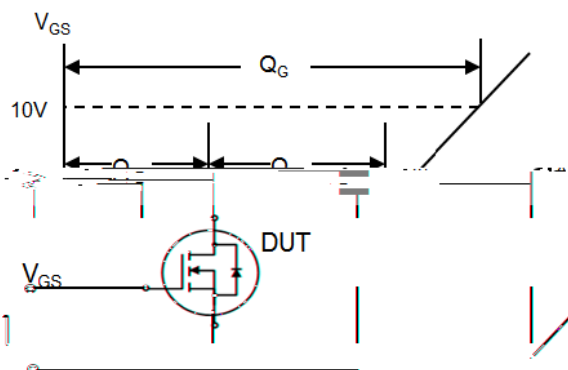
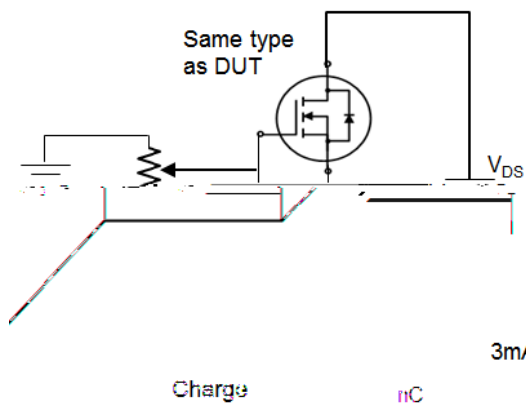
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit



HYG110C03LR1D4

P-Mosfet Electrical Characteristics (T_c =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HYG110C03LR1			Unit
			Min	Typ.	Max	
Static Characteristics						
B _{VDS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250 A	- 30	-		V
I _{DSS}	Drain-to-Source Leakage Current	V _{DS} =-30V, 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	-1.9	-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} =-6A	-	21	26	m
		V _{GS} =-4.5V, I _{DS} =-4A		43	55	
Diode Characteristics						
V _{SD} *	Diode Forward Voltage	I _{SD} =-1A, V _{GS} =0V	-	-0.76	-1.0	V
t _{rr}	Reverse Recovery Time	I _{SD} =-12A, dI _{SD} /dt=100A/s	-	10.0	-	ns
Q _{rr}	Reverse Recovery Charge	s	-	7.1	-	nC

P-Mosfet Electrical Characteristics (Cont.) (T_c =25°C Unless Otherwise Noted) T_c =25

Symbol	Parameter	Test Conditions	HYG110C03LR1			Unit
			Min			

P-Mosfet Typical Operating Characteristics

Figure 1: Power Dissipation

Figure 2: Drain Current

Tc-Case Temperature()

Tc-Case Temperature()

Figure 3: Safe Operation Area

Figure 4: Thermal Transient Impedance

$-V_{TY}$

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P-Mosfet Typical Operating Characteristics

Figure 7: On-Resistance vs. Temperature

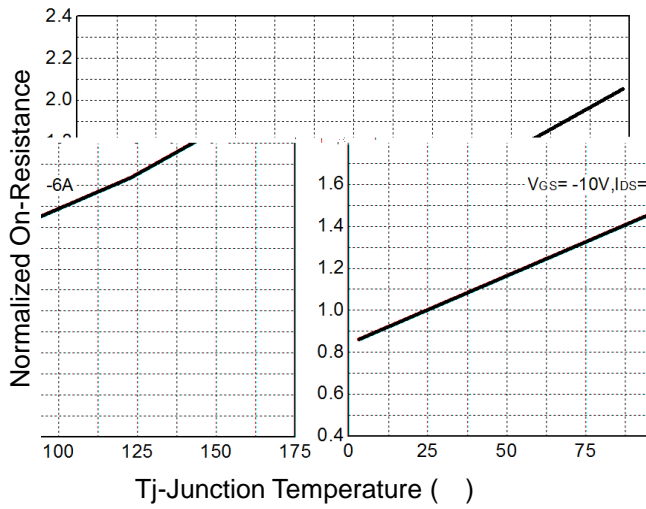


Figure 8: Source-Drain Diode Forward

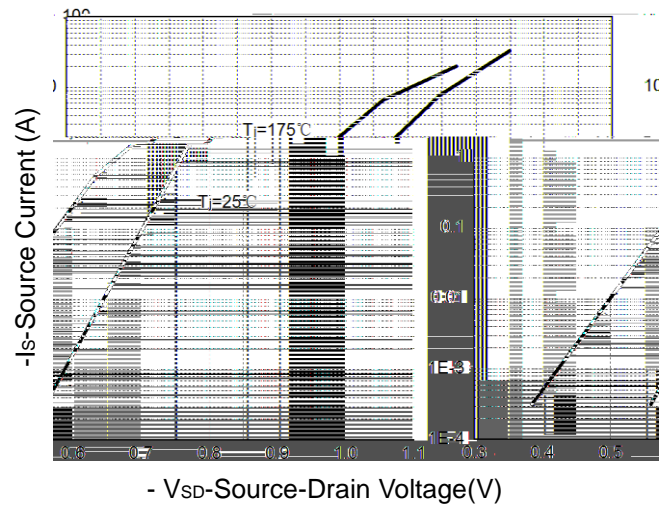


Figure 9: Capacitance Characteristics

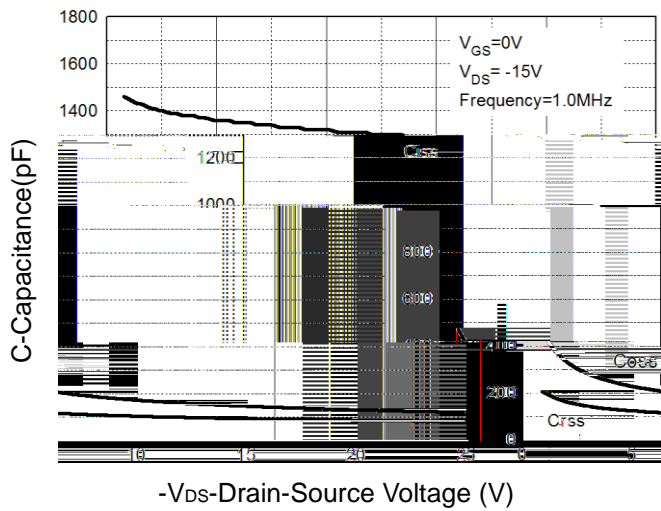
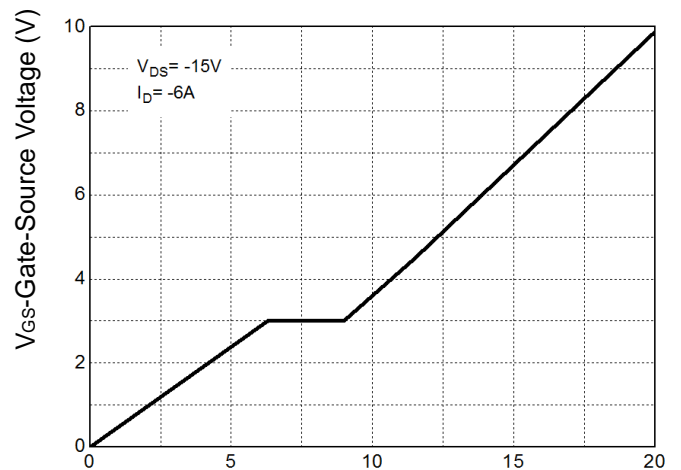
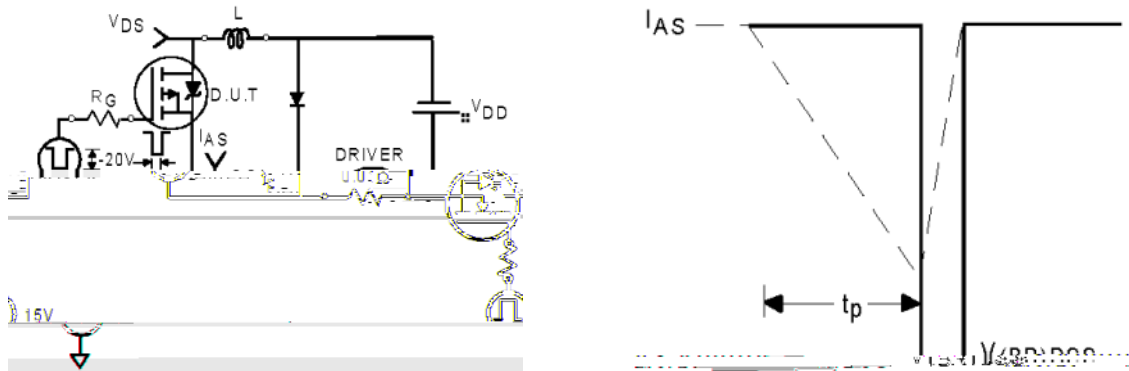


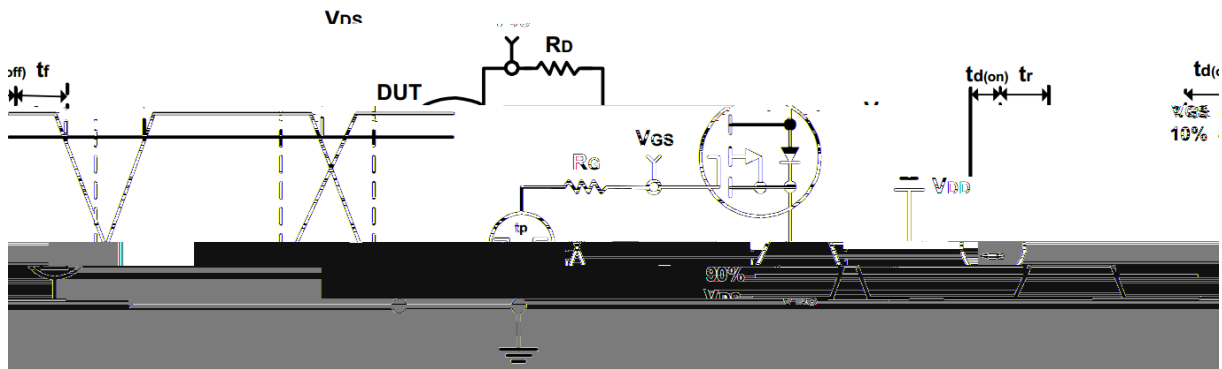
Figure 10: Gate Charge Characteristics



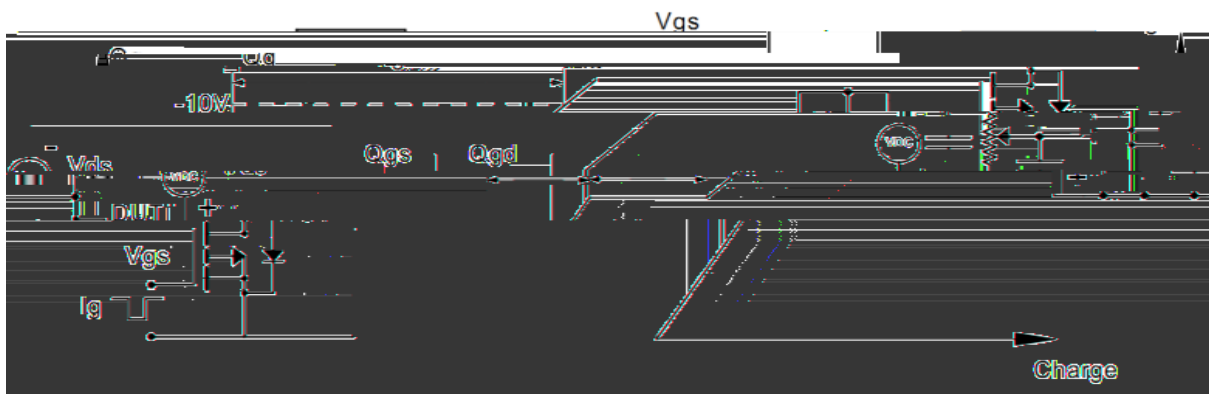
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit

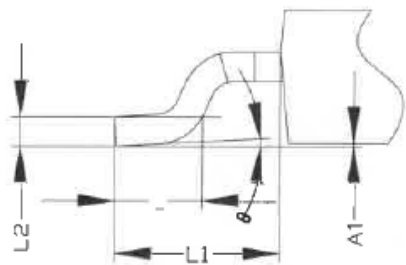
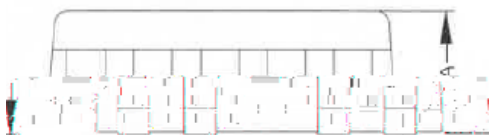
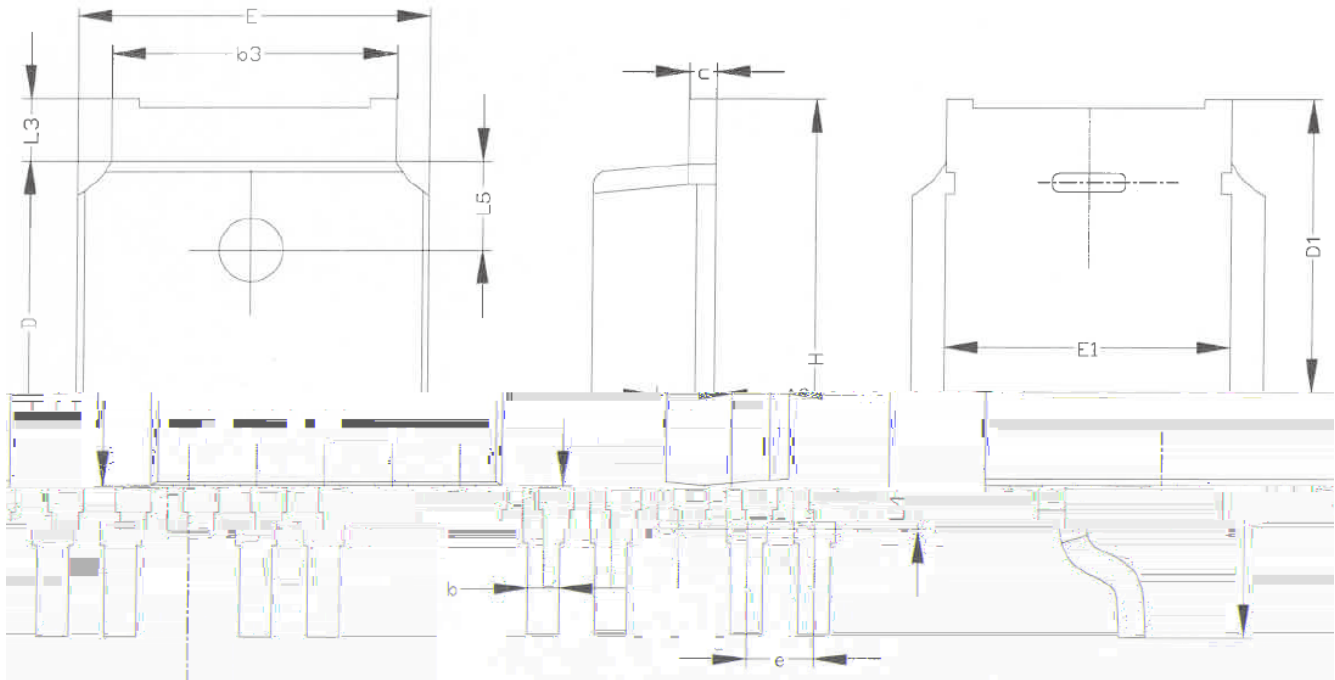


Device Per Unit

Package Type	Unit	Quantity
TO-252-4L	Reel	2500
TO-252-4L	Tube	75

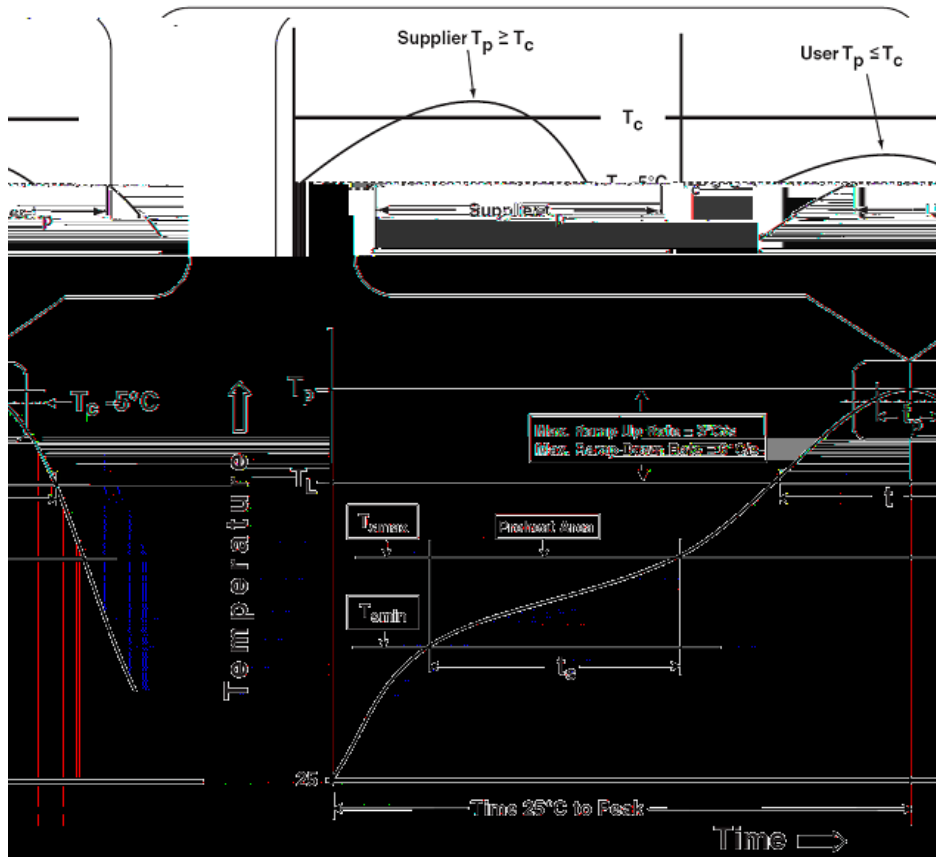
Package Information

TO-252-4L



COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.55	0.62	0.70
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	5.10	-	-
e	1.27 BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
L5	1.65	1.80	1.95
	0°	-	8°

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.		

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Table 1.SnPb Eutectic Process Classification Temperatures (Tc)

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

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

Package Thickness	Volume mm <350	Volume mm 350-2000	Volume mm 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	