

700V N-Channel Super Junction Power MOSFET

GENERAL DESCRIPTION

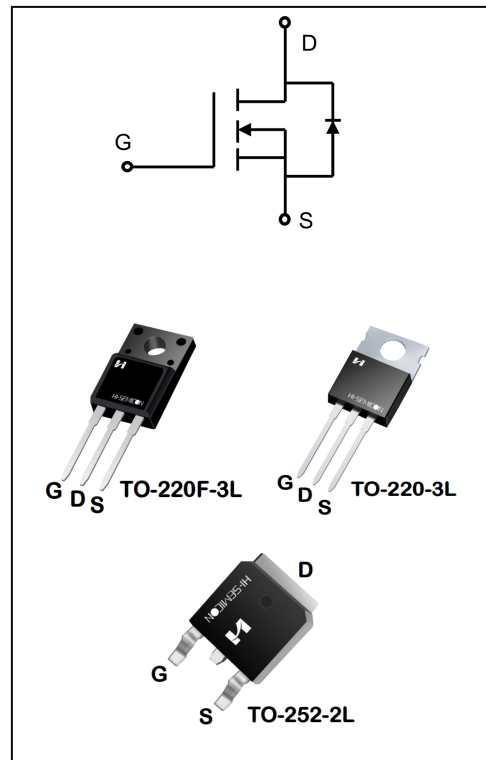
The Power MOSFET is fabricated using advanced super junction technology. The resulting device has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

Features

- ◆ $V_{DS, min}@T_j(max)=750V$
- ◆ $I_D=12A$
- ◆ $R_{DS(ON)}$
TYP: $0.31\Omega@V_{GS}=10V, I_D=6A$
MAX: 0.36Ω

Applications

- ◆ Power factor correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SCF70R360C6	TO-220F-3L	SCF70R360C6	Pb Free	Tube
SCP70R360C6	TO-220-3L	SCP70R360C6	Pb Free	Tube
SCD70R360C6	TO-252-2L	SCD70R360C6	Pb Free	Reel

ABSOLUTE MAXIMUM RATINGS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics		Symbol	Ratings		Unit
			SCF70R360C6	SCD/P70R360C6	
Drain-Source Voltage		V_{DS}	700		V
Gate-Source Voltage		V_{GS}	± 20		V
Drain Current	$T_C = 25^{\circ}\text{C}$	I_D	12		A
	$T_C = 100^{\circ}\text{C}$		7.6		
Drain Current Pulsed(Note 1)		I_{DM}	48		A
Power Dissipation($T_C=25^{\circ}\text{C}$) -Derate above 25°C		P_D	29.5	156	W
			0.23	1.25	W/ $^{\circ}\text{C}$
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	314.4		mJ
Operation Junction Temperature Range		T_J	$-55\sim+150$		$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	$-55\sim+150$		$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300		$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX		Unit
		SCF70R360C6	SCD/P70R360C6	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.4	0.96	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	$B_{V_{DS}}$	$V_{GS}=0V, I_D=250\mu A$	700	--	--	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=700V, V_{GS}=0V$	--	--	1.0	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=20V, V_{DS}=0V$	--	--	100	nA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=-20V, V_{DS}=0V$	--	--	-100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=5V, I_D=250\mu A$	3.0	4	5.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=6A$	--	0.31	0.36	Ω
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=6A$	--	10	--	S
Dynamic Characteristics						
Gate Rresistance	R_g	$V_{GS}=0V; f=1.0\text{MHz}$	--	2	--	Ω
Input Capacitance	C_{iss}	$V_{DS}=100V$ $V_{GS}=0V$ $f=1.0\text{MHz}$	--	1360	--	pF
Output Capacitance	C_{oss}		--	34	--	
Reverse Transfer Capacitance	C_{rss}		--	1.7	--	

Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=400V; V_{GS}=10V$ $R_G=5\Omega \quad I_D=6A$ (Note 3.4)	--	24.5	--	nS
Turn-on Rise Time	t_r		--	17	--	
Turn-off Delay Time	$t_{d(off)}$		--	34.5	--	
Turn-off Fall Time	t_f		--	13	--	
Total Gate Charge	Q_g	$V_{DS}=480V, I_D=6A$ $V_{GS}=10V$ (Note 3.4)	--	22.5	--	nC
Gate-Source Charge	Q_{gs}		--	9.0	--	
Gate-Drain Charge	Q_{gd}		--	6.3	--	

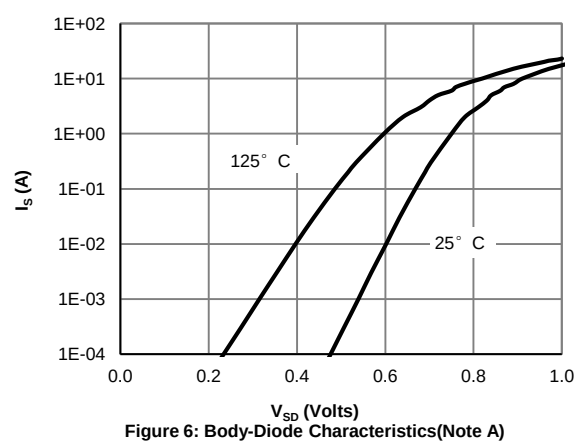
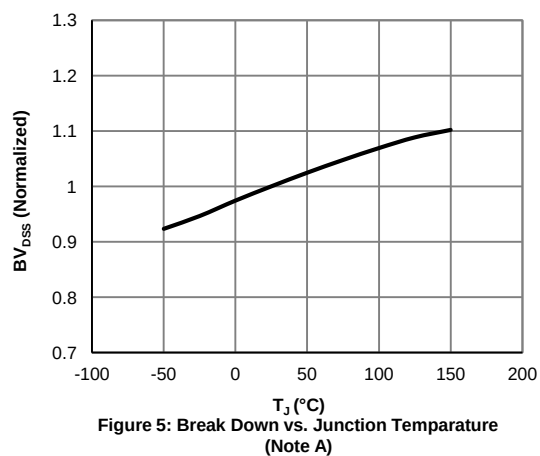
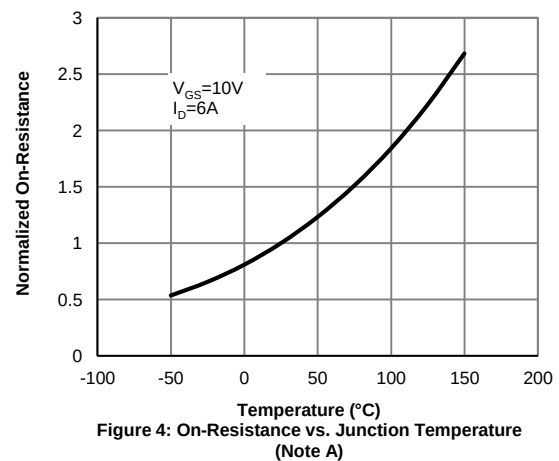
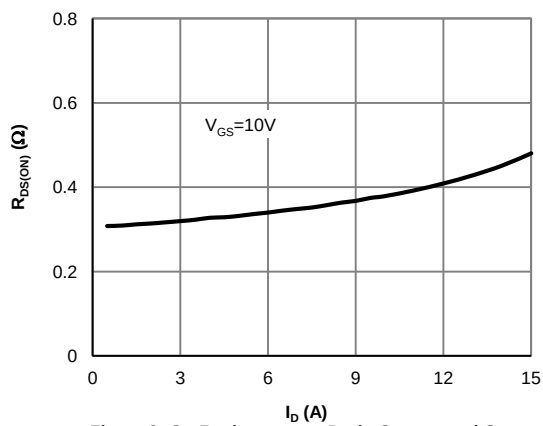
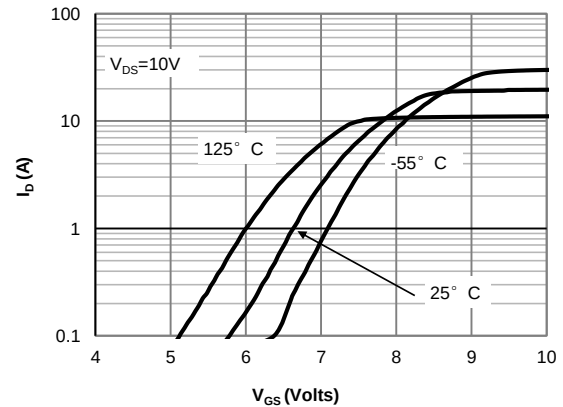
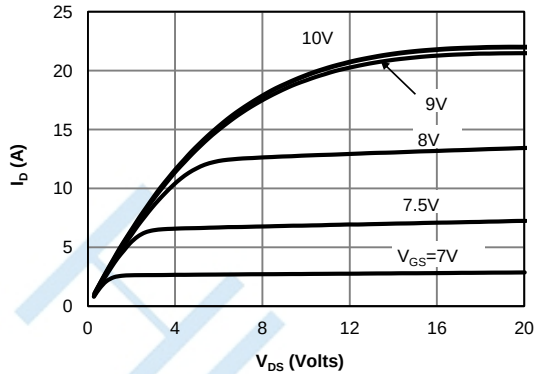
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	12	A
Pulsed Source Current	I_{SM}		--	--	48	
Diode Forward Voltage	V_{SD}	$I_S=6A, V_{GS}=0V$	--	0.86	1.2	V
Reverse Recovery Time	T_{rr}	$I=6A, V_{DS}=600V,$ $dI/dt=100A/\mu S$ (Note 3)	--	310	--	ns
Reverse Recovery Charge	Q_{rr}		--	4.8	--	μC

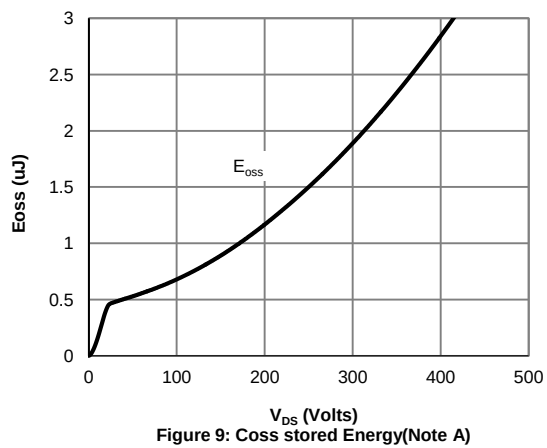
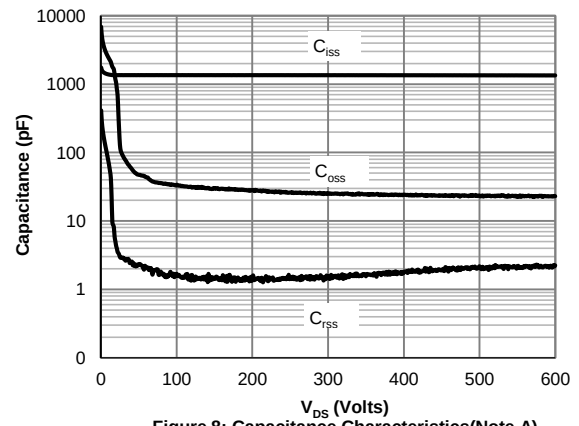
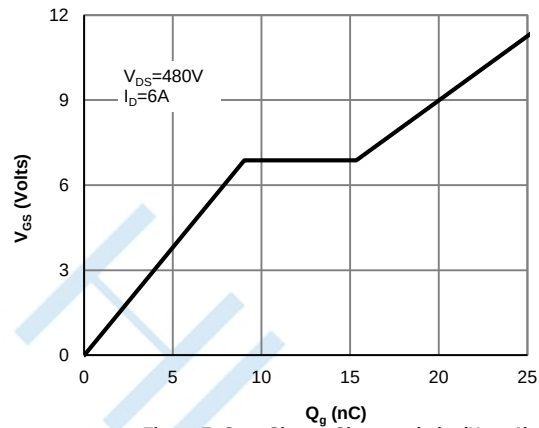
NOTE:

1. Pulse width limited by maximum junction temperature
2. $L=79mH, I_{AS}=2.6A, V_{DD}=100V, V_G=10V, R_G=25\Omega$, starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

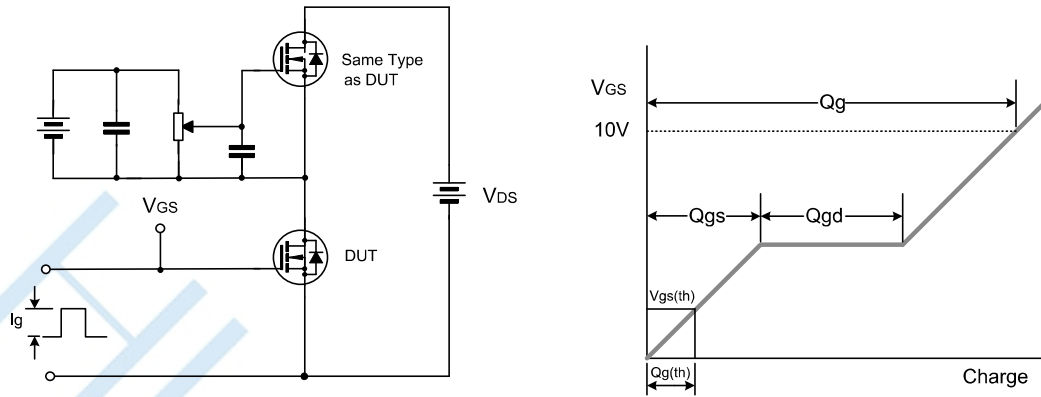
Typical Performance Characteristics



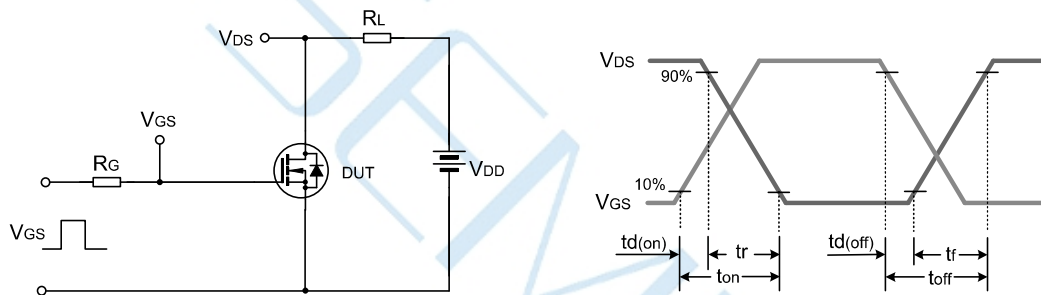
Typical Performance Characteristics



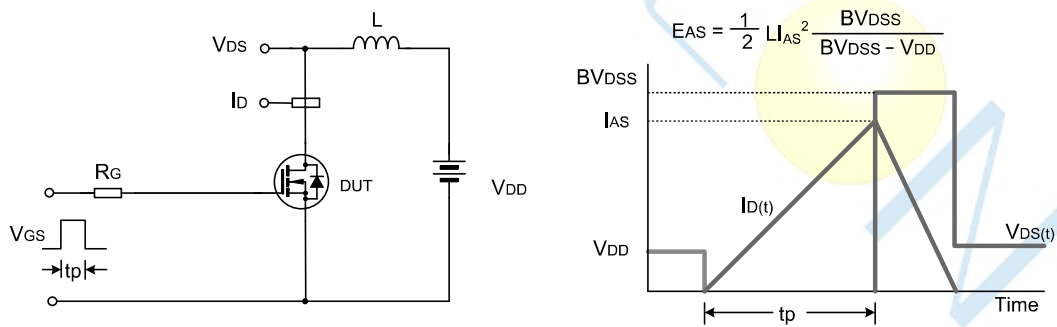
Test Circuit



Gate Charge Test Circuit & Waveform



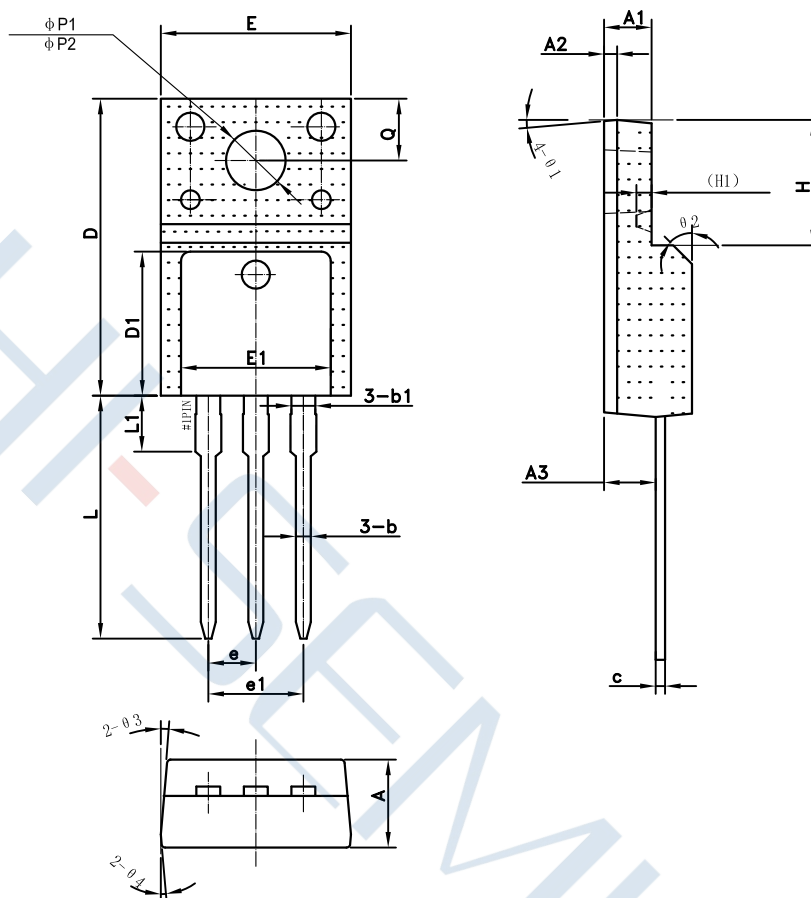
Resistive Switching Test Circuit & Waveform



EAS Test Circuit & Waveform

Package Dimensions of TO-220F-3L

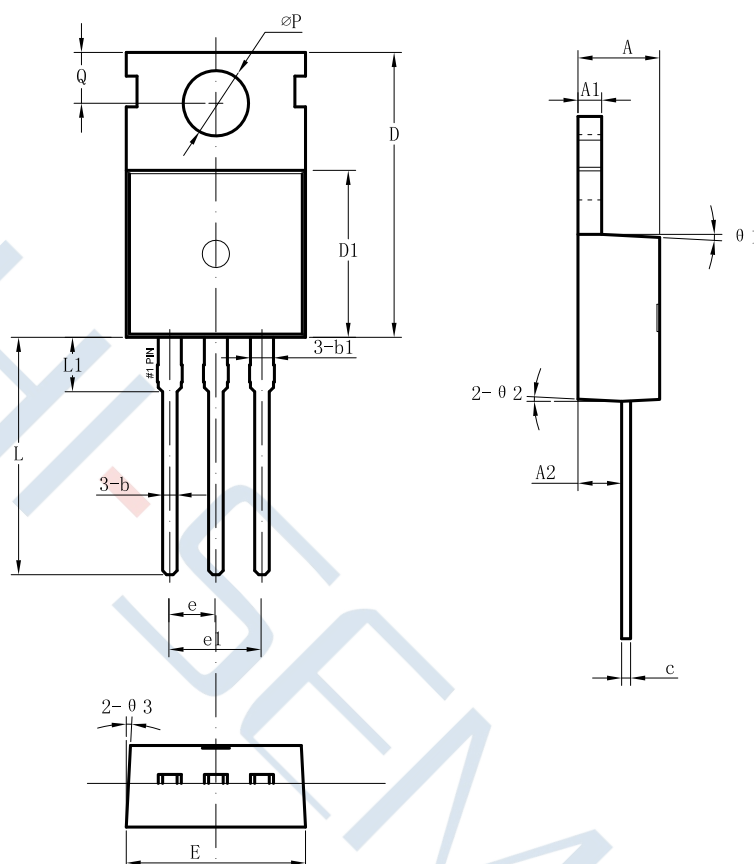
Unit:mm



Symbol	Mechanical Dimension/mm		
	Min	Typ	Max
A	4.50	4.70	4.90
A1	2.44	2.54	2.64
A2	0.60	0.70	0.80
A3	2.56	2.76	2.96
b	0.70	0.80	0.95
b1		1.28	
c	0.45	0.50	0.65
D	15.67	15.87	16.07
D1		7.70	
E	9.96	10.16	10.36
E1		8.00	
e		2.54	
e1		5.08	
H	6.50	6.70	6.90
(H1)		(0.81)	
L	12.48	12.98	13.20
L1		2.93	
$\phi P1$	2.98	3.18	3.38
$\phi P2$	3.20	3.40	3.60
Q	3.10	3.30	3.50
$\theta 1$		5°	
$\theta 2$		45°	
$\theta 3$		5°	
$\theta 4$		5°	

Package Dimensions of TO-220-3L

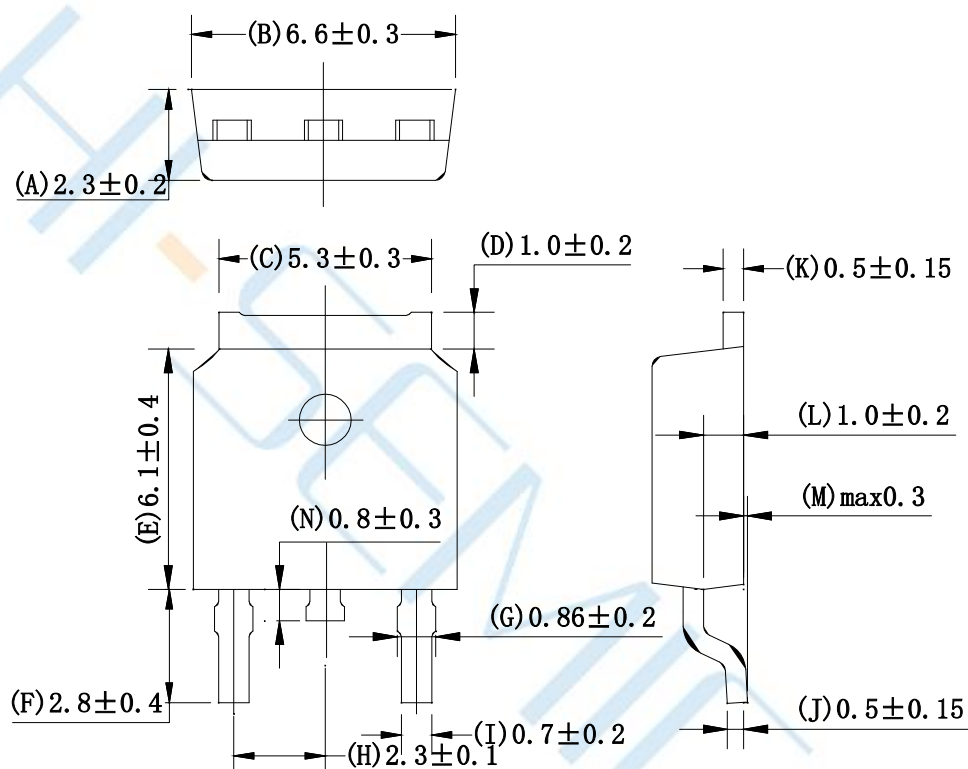
Unit:mm



符号	机械尺寸/mm		
	最小值	典型值	最大值
A	4.30	4.50	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b1		1.27	
c	0.40	0.50	0.65
D	15.20	15.70	16.20
D1	9.00	9.20	9.40
E	9.70	10.0	10.10
e		2.54	
e1		5.08	
L	12.60	13.08	13.60
L1		3.00	
ϕP	3.50	3.60	3.80
Q	2.60	2.80	3.00
$\theta 1$		3°	
$\theta 2$		3°	
$\theta 3$		3°	

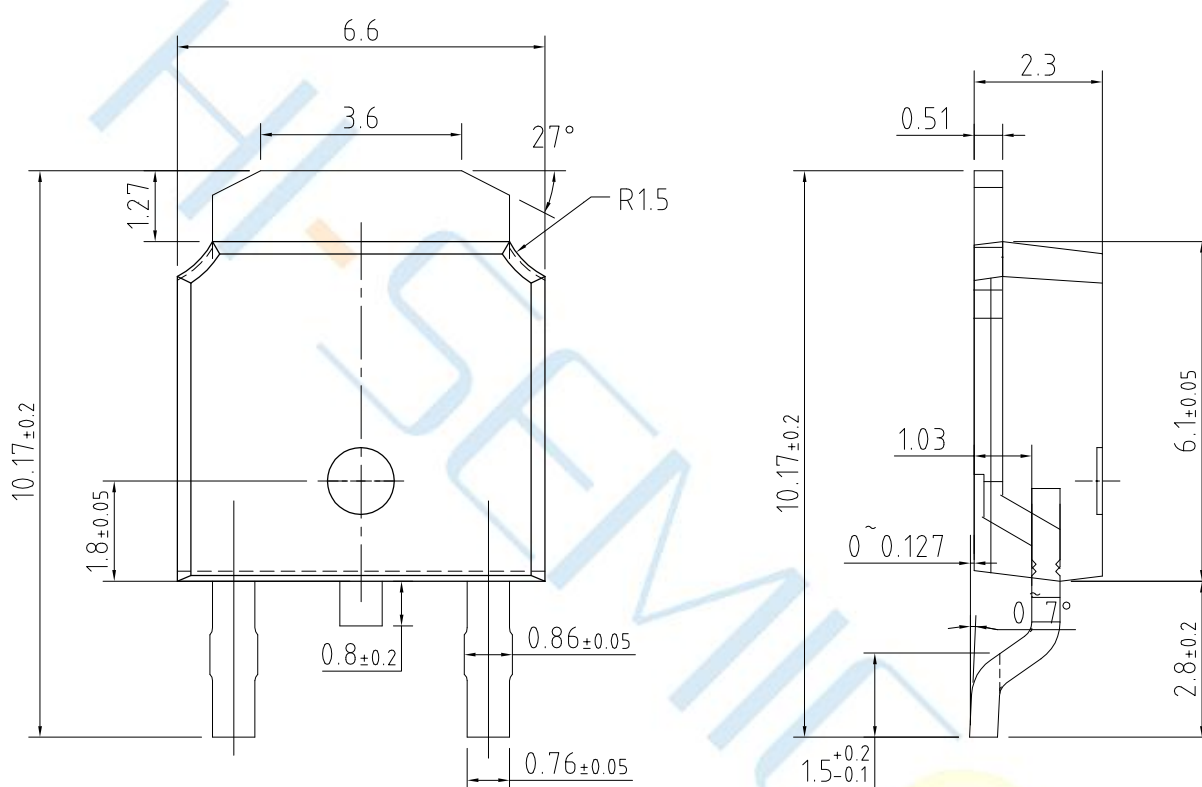
Package Dimensions of TO-252-2L

Unit:mm



Package Dimensions of TO-252-2L

Unit:mm



Disclaimer:

- ▶ Hi-semicon reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- ▶ All semiconductor products malfunction or fail with some probability under special conditions. When using Hi-semicon products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Hi-semicon products could cause loss of body injury or damage to property.
- ▶ Hi-semicon will supply the best possible product for customers!