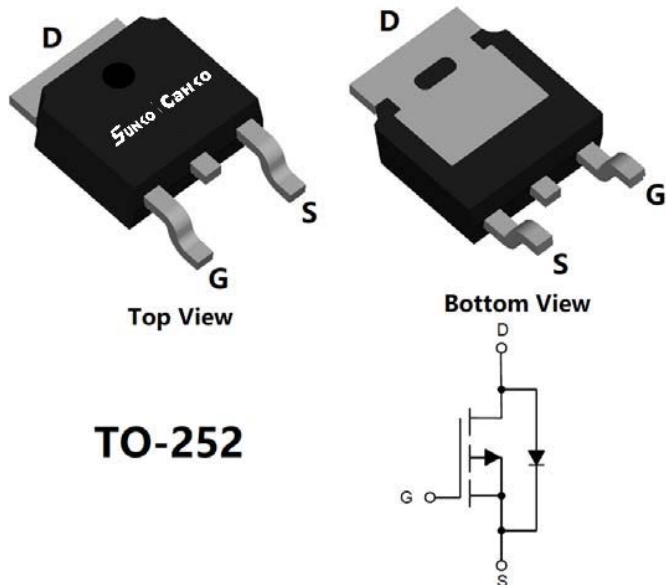


P-Channel Enhancement Mode Field Effect Transistor



Product Summary

• V_{DS}	-40 V
• I_D	-50 A
• $R_{DS(on)}$ (at $V_{GS}=-10V$)	<15 mΩ
• $R_{DS(on)}$ (at $V_{GS}=-4.5V$)	<22 mΩ
• 100% EAS Tested	
• 100% ∇V_{DS} Tested	

General Description

- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Power management
- Portable equipment

Limiting Values

Parameter	Conditions		Symbol	Min	Max	Unit
Drain-source Voltage	$T_J \geq 25\text{ }^{\circ}\text{C}$; $T_J \leq 150\text{ }^{\circ}\text{C}$		V_{DS}	-	-40	V
Gate-source Voltage	$T_J \leq 150\text{ }^{\circ}\text{C}$; DC		V_{GS}	-20	20	
Continuous Drain Current	Steady-State	$T_A=25^{\circ}\text{C}$, $V_{GS}=10\text{V}$	I_D	-	-8	A
		$T_A=100^{\circ}\text{C}$, $V_{GS}=10\text{V}$		-	-7	
Continuous Drain Current	Steady-State	$T_C=25^{\circ}\text{C}$, $V_{GS}=10\text{V}$		-	-50	
		$T_C=100^{\circ}\text{C}$, $V_{GS}=10\text{V}$		-	-31	
Pulsed Drain Current ^A	$T_C=25^{\circ}\text{C}$, $t_p \leq 10\mu\text{s}$		I_{DM}	-	-200	
Maximum Body-Diode Continuous Current			I_S		-50	
Avalanche energy ^B (non-repetitive)	$V_G=-10\text{V}$, $R_G=25\Omega$, $L=0.5\text{mH}$, $I_{AS}=-9.5\text{A}$		EAS	-	22.5	mJ
Total Power Dissipation ^C	Steady-State	$T_A=25^{\circ}\text{C}$	P_D	-	2.5	W
		$T_A=100^{\circ}\text{C}$		-	1	
Total Power Dissipation ^C	Steady-State	$T_C=25^{\circ}\text{C}$		-	83	
		$T_C=100^{\circ}\text{C}$		-	33	
Junction and Storage Temperature Range			T_J, T_{STG}	-55	150	$^{\circ}\text{C}$

Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient ^D	Steady-State	$R_{\theta JA}$	40	50	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	1.2	1.5	

Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
SCD50P04AJ	F1	SCD50P04AJ	2500	/	25000	13" reel

■ Electrical Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D =-250μA	-40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D =-250μA	-1	-1.5	-2.5	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-20A		11.5	15	mΩ
		V _{GS} =-4.5V, I _D =-20A	-	14	22	
Diode Forward Voltage	V _{SD}	I _S =-20A, V _{GS} =0V	-	-0.85	-1.2	V
Gate resistance	R _G	f=1MHz	-	10	-	Ω
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =-25V, V _{GS} =0V, f=1MHz	-	3500	-	pF
Output Capacitance	C _{oss}		-	270	-	
Reverse Transfer Capacitance	C _{rss}		-	230	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =-10V, V _{DS} =-20V, I _D =-25A	-	73.3	-	nC
Gate-Source Charge	Q _{gs}		-	8.9	-	
Gate-Drain Charge	Q _{gd}		-	15.3	-	
Reverse Recovery Charge	Q _{rr}	I _F =-25A, di/dt=100A/us	-	12.9	-	nC
Reverse Recovery Time	t _{rr}		-	25.4	-	ns
Turn-on Delay Time	t _{D(on)}	V _{GS} =-10V, V _{DD} =-20V, I _D =-25A R _{GEN} =6Ω	-	13.6	-	ns
Turn-on Rise Time	t _r		-	11.8	-	
Turn-off Delay Time	t _{D(off)}		-	201.5	-	
Turn-off fall Time	t _f		-	92.5	-	

A. Repetitive rating; pulse width limited by max. junction temperature.

B. T_J=25°C, V_{DD}=-70V, V_G=-10V, L=0.5mH, I_{AS}=-9.5A.

C. P_d is based on max. junction temperature, using junction-case and junction-ambient thermal resistance.

D. The value of RθJA is measured with the device mounted on the minimum recommend pad size, in the still air environment with T_A =25°C. The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

■ Typical Electrical and Thermal Characteristics Diagrams

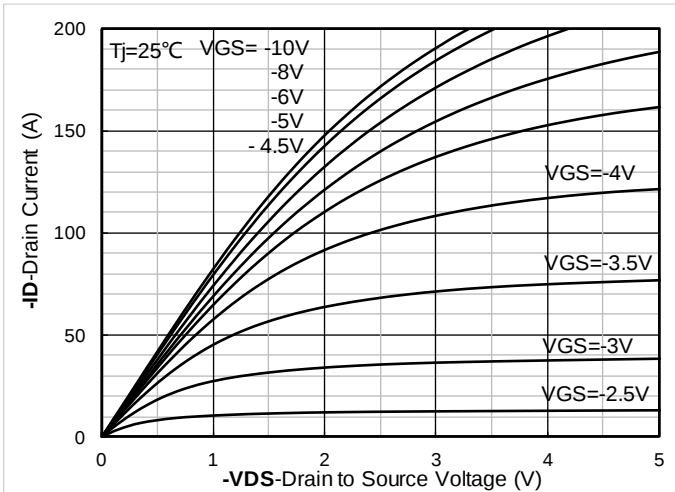


Figure 1. Output Characteristics

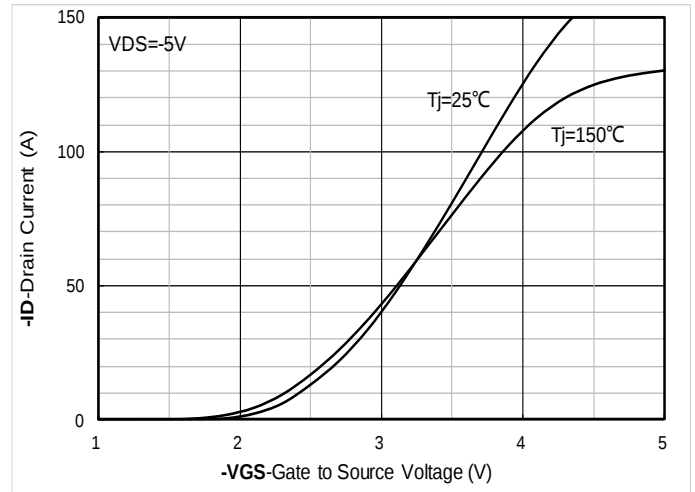


Figure 2. Transfer Characteristics

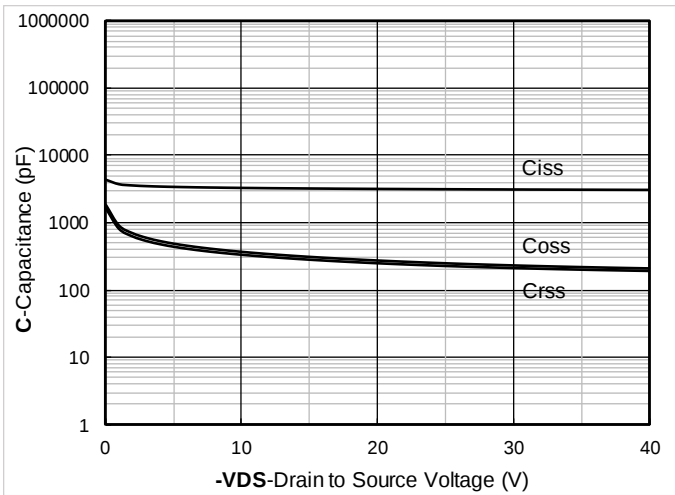


Figure 3. Capacitance Characteristics

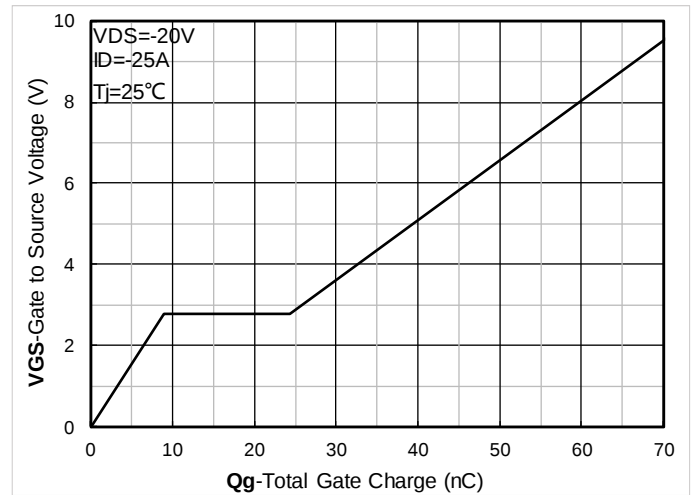


Figure 4. Gate Charge

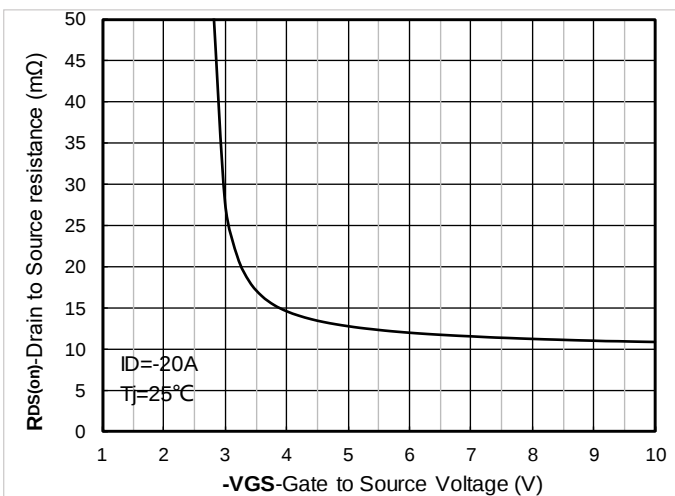


Figure 5. On-Resistance vs Gate to Source Voltage

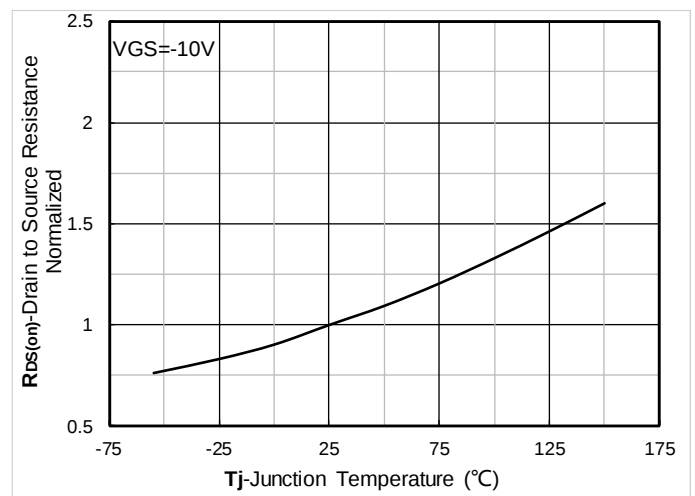


Figure 6. Normalized On-Resistance

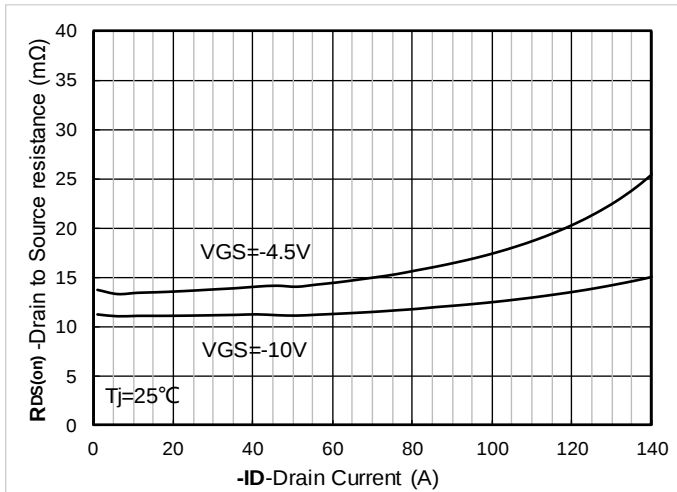


Figure 7. $R_{DS(on)}$ VS Drain Current

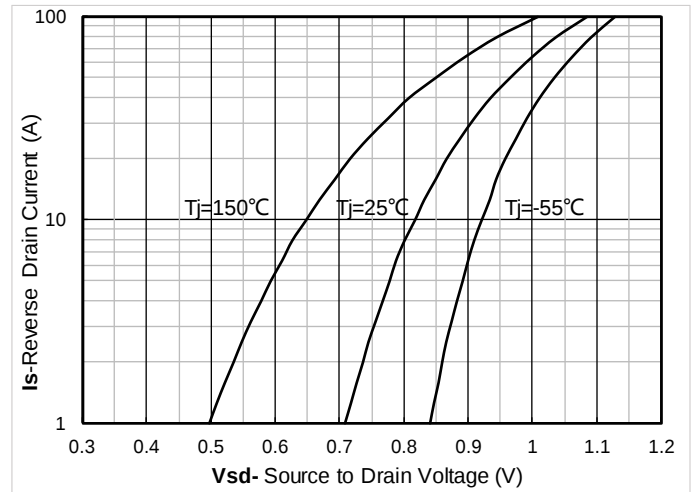


Figure 8. Forward characteristics of reverse diode

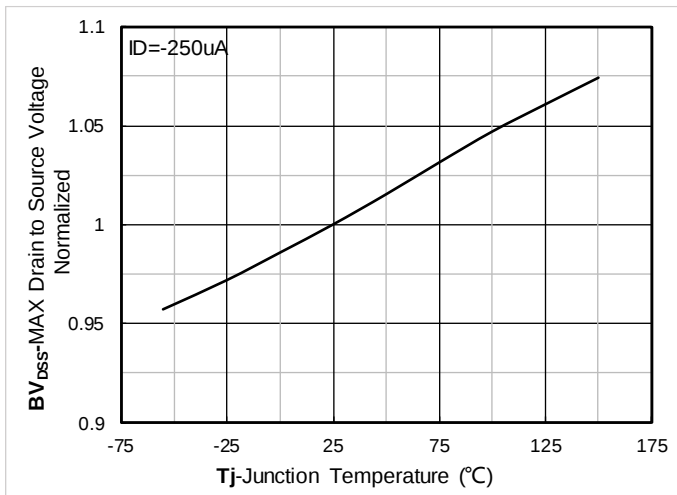


Figure 9. Normalized breakdown voltage

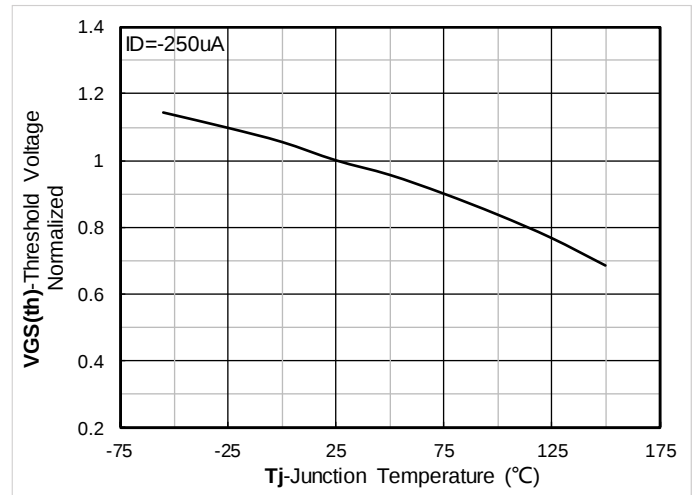


Figure 10. Normalized Threshold voltage

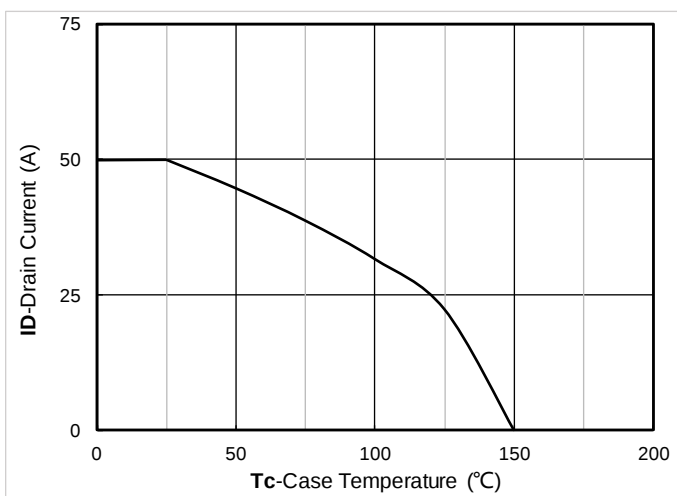


Figure 11. Current dissipation

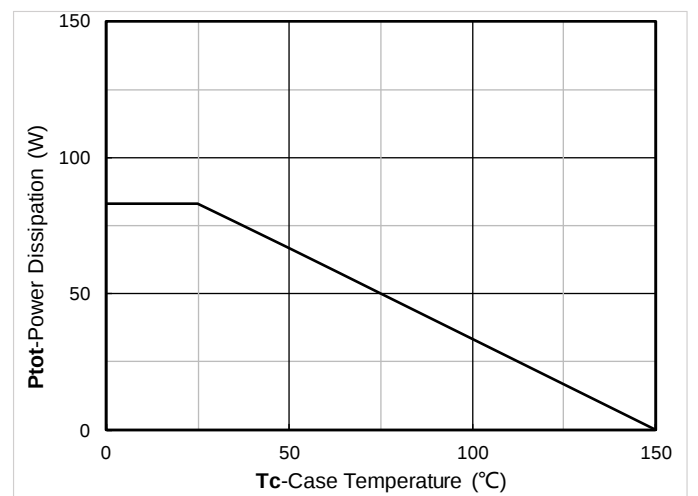


Figure 12. Power dissipation

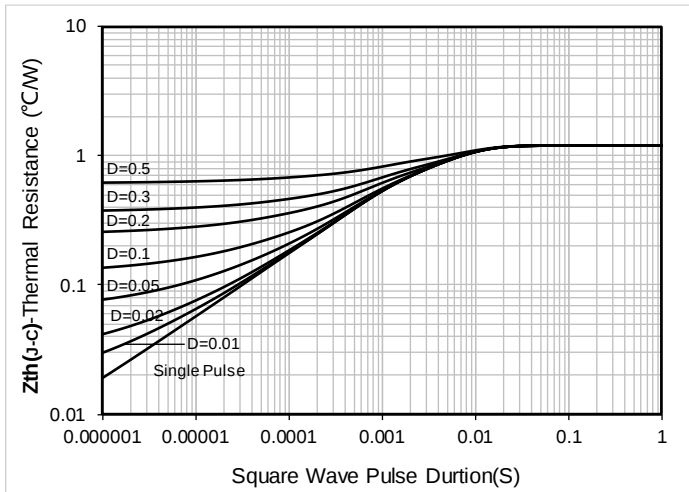


Figure 13. Maximum Transient Thermal Impedance

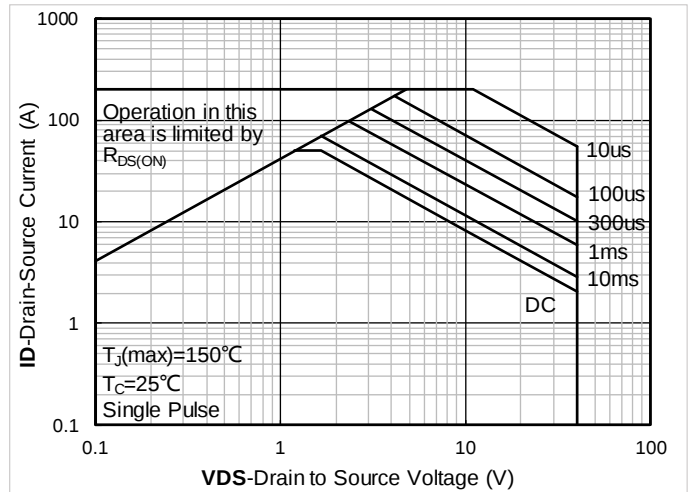
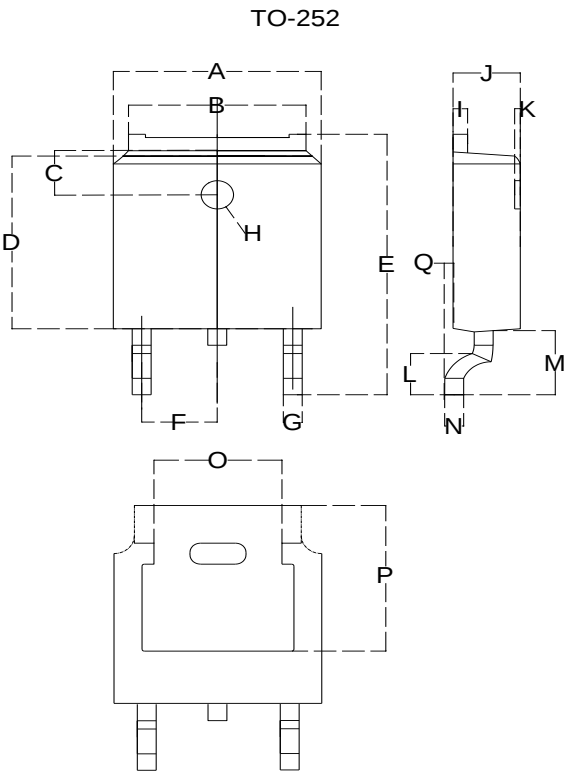


Figure 14. Safe Operation Area

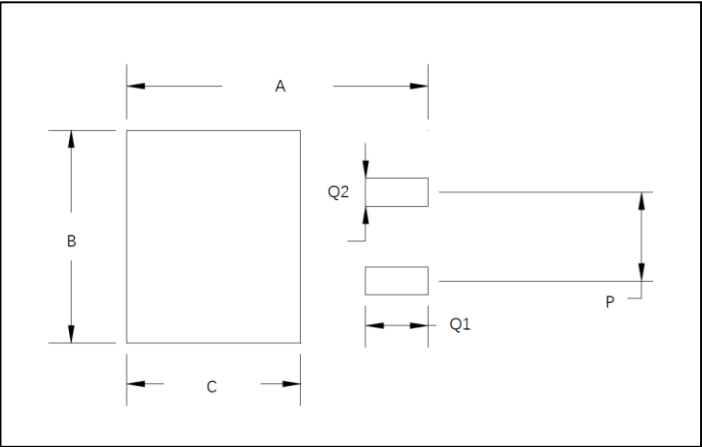
■ TO-252 Package information



Dimensions in millimeters

TO-252		
Dim	Min	Max
A	6.500	6.700
B	5.100	5.460
C	1.400	1.800
D	6.000	6.200
E	10.000	10.400
F	2.166	2.366
G	0.660	0.860
H	Φ1.050	Φ1.350
I	0.460	0.580
J	2.200	2.400
K	0	0.300
L	0.890	2.290
M	2.730	3.080
N	0.430	0.580
O	4.20	4.95
P	5.15	5.45
Q	0	0.2

■ Suggested Pad Layout



Dim	Millimeters
A	11.4
B	6.74
C	6.23
P	4.56
Q1	2.28
Q2	1.52

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