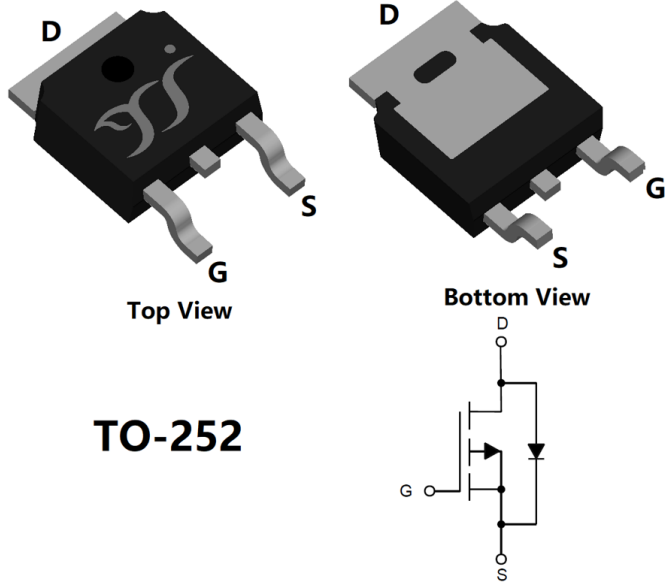


P-Channel Enhancement Mode Field Effect Transistor



TO-252

Product Summary

- V_{DS} -40 V
- I_D -50 A
- $R_{DS(ON)}$ (at $V_{GS}=-10V$) <15 m Ω
- $R_{DS(ON)}$ (at $V_{GS}=-4.5V$) <22 m Ω
- 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
- Part no. with suffix "Q" means AEC-Q101 qualified

Applications

- Power management
- Portable equipment
- 12V Automotive systems

■ Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	-40	V
Gate-source Voltage		V_{GS}	± 20	V
Drain Current	$T_A=25^\circ C$	I_D	8	A
	$T_A=100^\circ C$		7	
	$T_C=25^\circ C$		50	
	$T_C=100^\circ C$		31	
Pulsed Drain Current ^A		I_{DM}	200	A
Avalanche energy ^B		EAS	22.5	mJ
Total Power Dissipation ^C	$T_A=25^\circ C$	P_D	2.5	W
	$T_A=100^\circ C$		1	
	$T_C=25^\circ C$		83	
	$T_C=100^\circ C$		33	
Junction and Storage Temperature Range		T_J, T_{STG}	-55~+150	$^\circ C$

■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient ^D	Steady-State	$R_{\theta JA}$	40	50	$^\circ C/W$
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
YJD50P04AJQ	F1	YJD50P04AJ	2500	/	25000	13" reel



YJD50P04AJQ

■ 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
Maximum Body-Diode Continuous Current	I _S		-	-	-50	A
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 TA =25°C. The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.



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Typical Electrical and Thermal Characteristics Diagrams

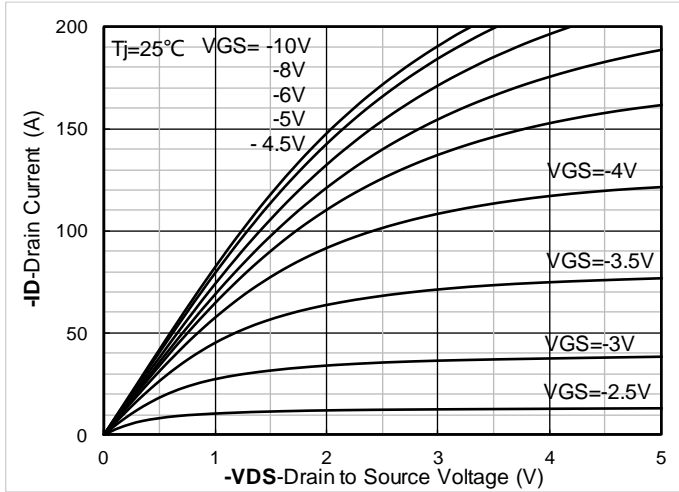


Figure 1. Output Characteristics

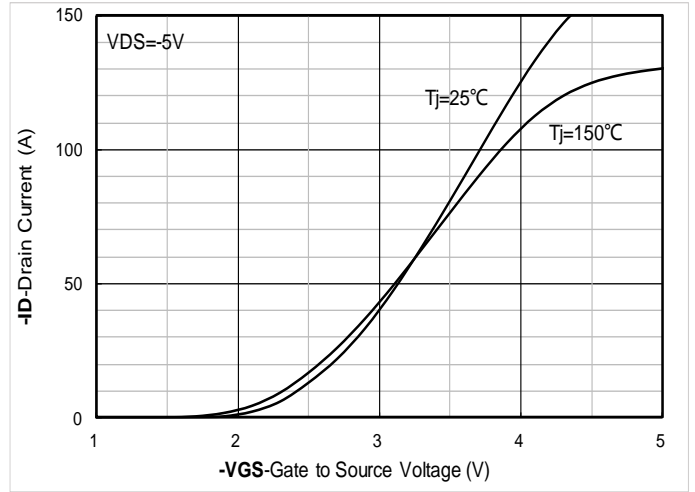


Figure 2. Transfer Characteristics

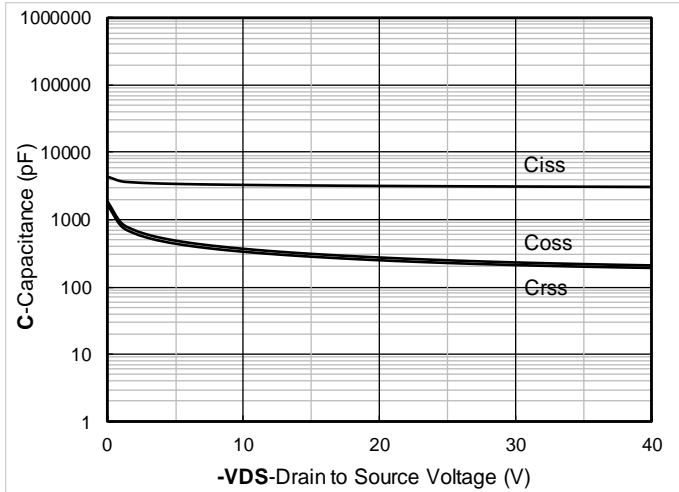


Figure 3. Capacitance Characteristics

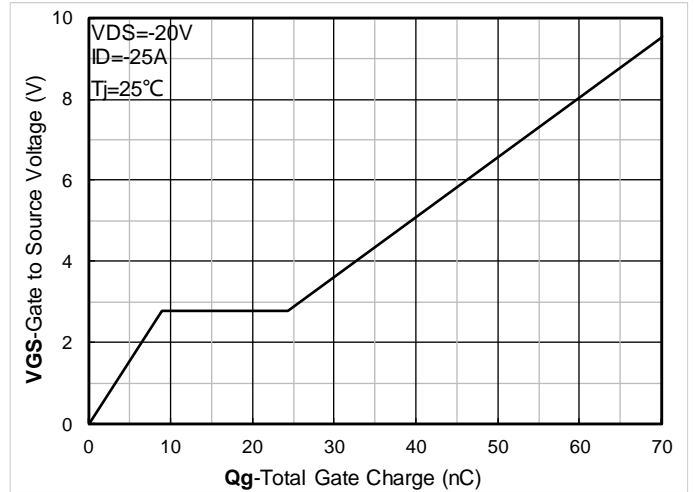


Figure 4. Gate Charge

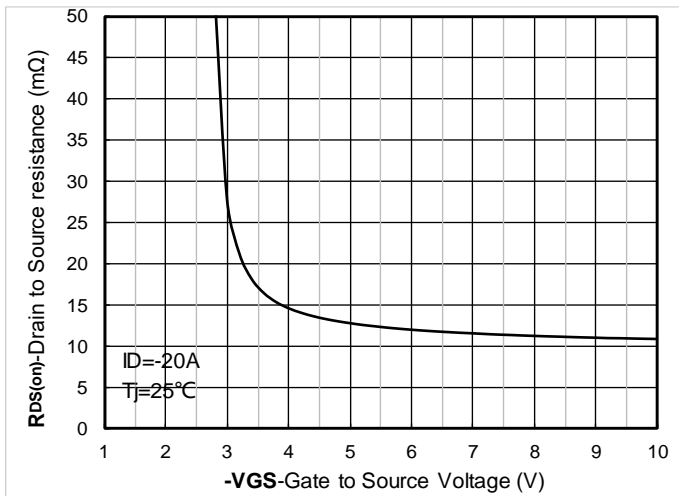


Figure 5. On-Resistance vs Gate to Source Voltage

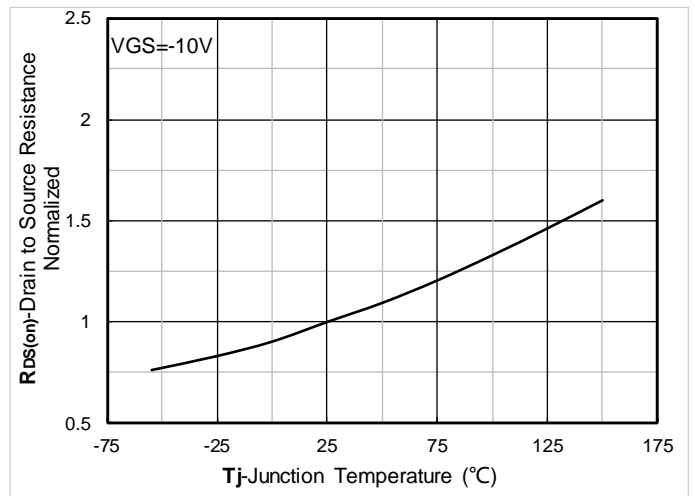


Figure 6. Normalized On-Resistance



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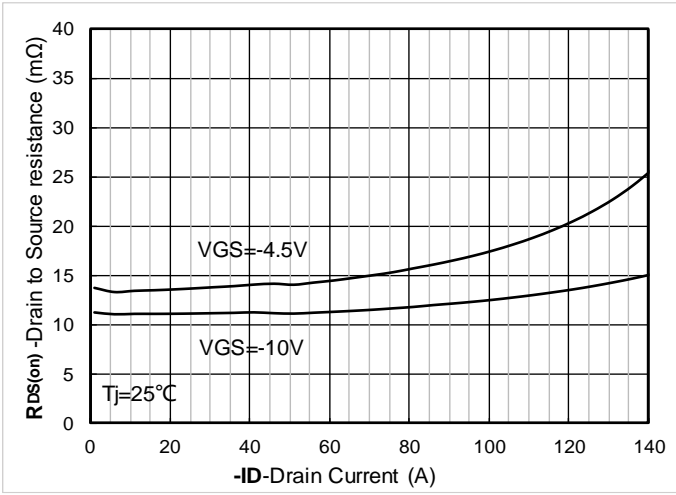


Figure 7. $R_{DS(on)}$ VS Drain Current

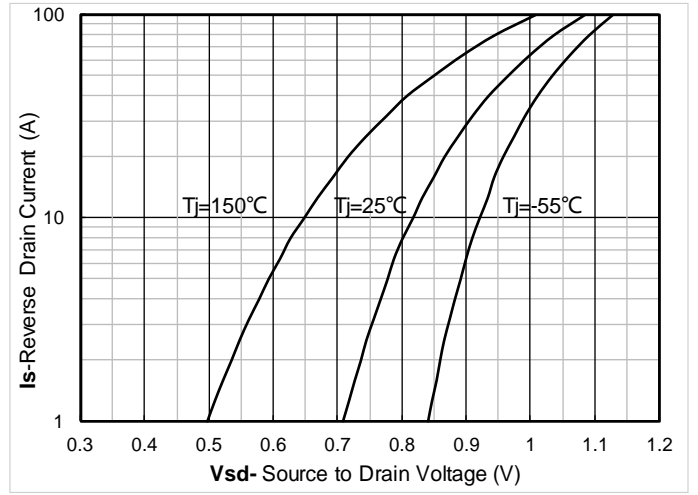


Figure 8. Forward characteristics of reverse diode

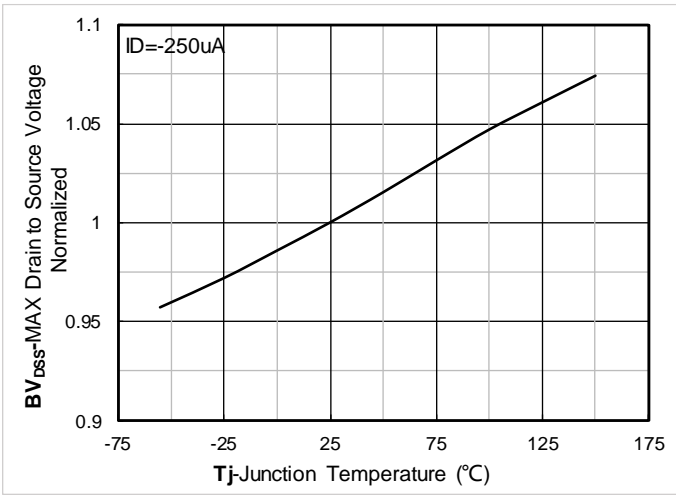


Figure 9. Normalized breakdown voltage

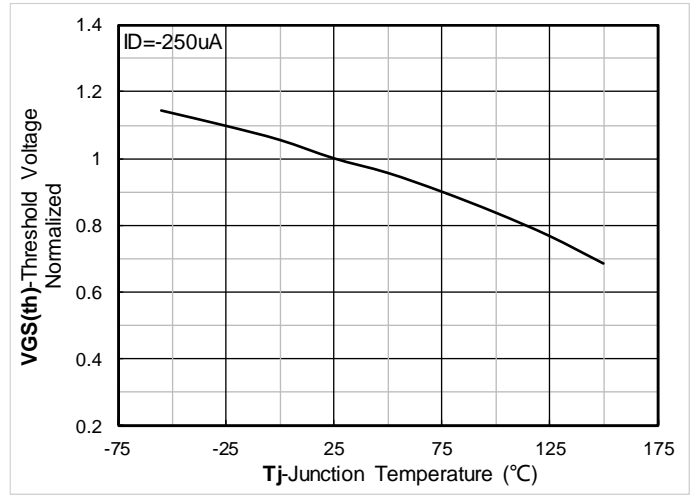


Figure 10. Normalized Threshold voltage

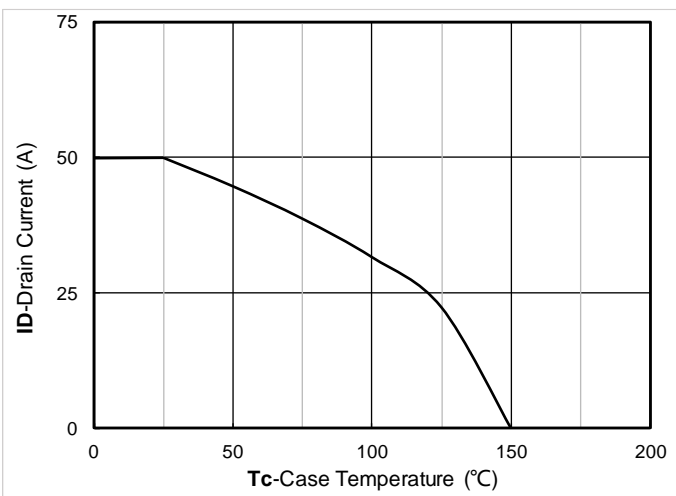


Figure 11. Current dissipation

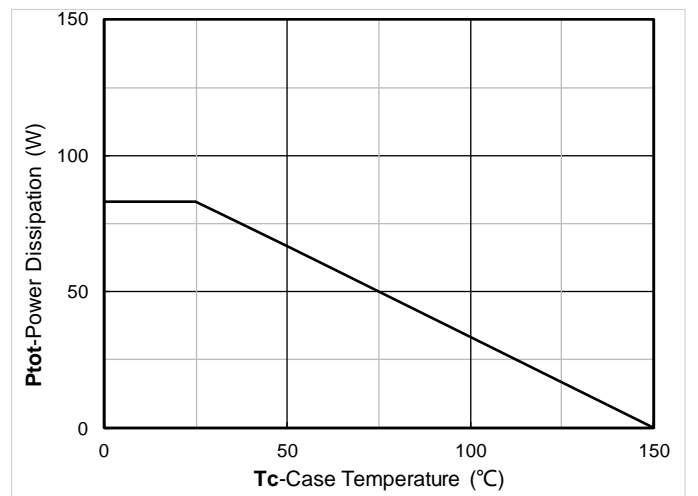


Figure 12. Power dissipation



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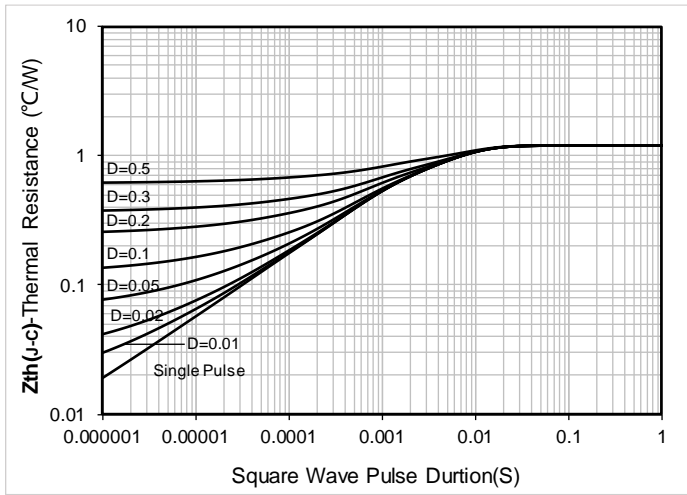


Figure 13. Maximum Transient Thermal Impedance

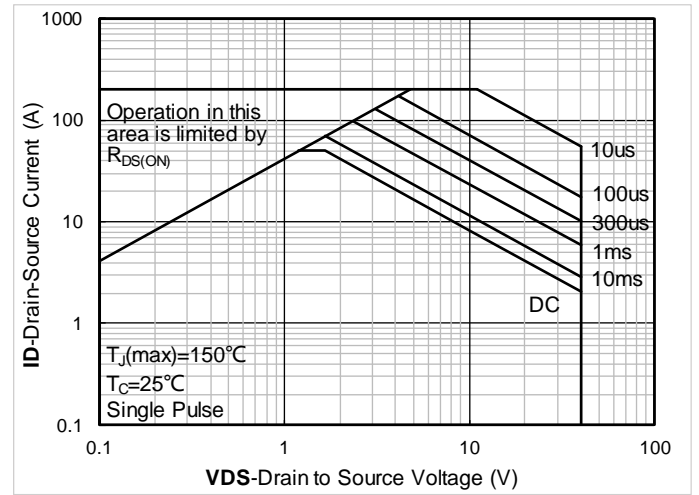
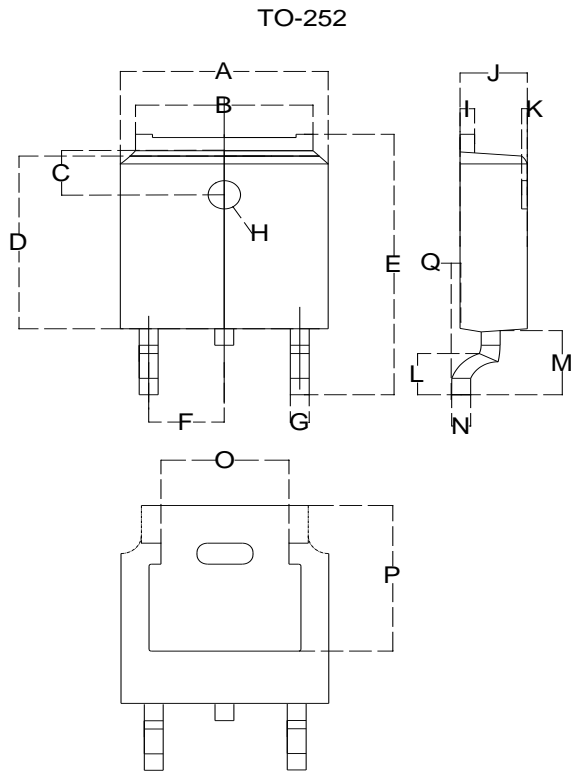


Figure 14. Safe Operation Area

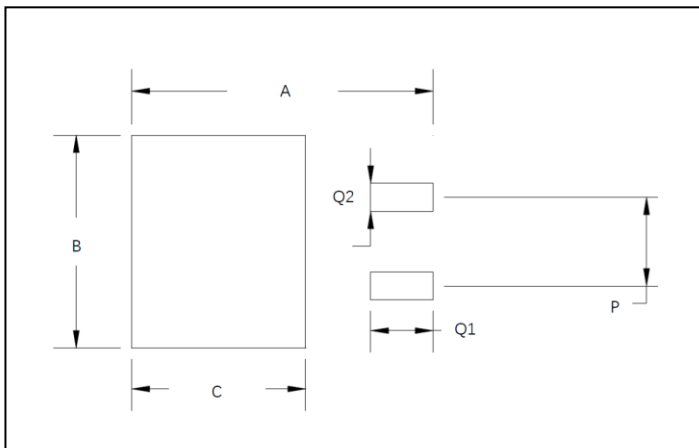
■ TO-252 Package information



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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