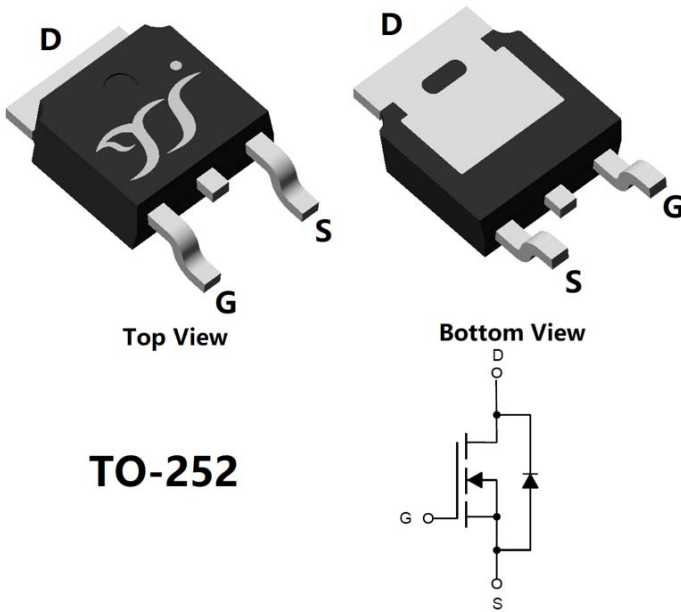


## N-Channel Enhancement Mode Field Effect Transistor



**TO-252**

### Product Summary

• $V_{DS}$	100V
• $I_D$	55A
• $R_{DS(on)}$ ( at $V_{GS}=10V$ )	< 11m $\Omega$
• $R_{DS(on)}$ ( at $V_{GS}=4.5V$ )	< 16m $\Omega$
• 100% EAS Tested	
• 100% $\nabla V_{DS}$ Tested	

### General Description

- Low  $R_{DS(on)}$  & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery
- Part no. with suffix "Q" means AEC-Q101 qualified

### Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply
- DC-DC convertor
- 12V Automotive systems

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

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	100	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	$T_C=25^\circ\text{C}$	$I_D$	55	A
	$T_C=100^\circ\text{C}$		38	
	$T_A=25^\circ\text{C}$		8.5	
	$T_A=100^\circ\text{C}$		6	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	220	A
Avalanche energy <sup>B</sup>		EAS	76	mJ
Total Power Dissipation <sup>C</sup>	$T_C=25^\circ\text{C}$	$P_D$	83	W
	$T_C=100^\circ\text{C}$		41	
	$T_A=25^\circ\text{C}$		3	
	$T_A=100^\circ\text{C}$		1.5	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+175	$^\circ\text{C}$



## YJD55G10AQ

### ■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient <sup>D</sup>	Steady-State	$R_{\theta JA}$	40	50	°C/W
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	1.5	1.8	

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD55G10AQ	F1	YJD55G10A	2500	/	25000	13"Reel

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

B.  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=80\text{V}$ ,  $V_G=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=0.5\text{mH}$ ,  $I_{AS}=17.5\text{A}$ .

C.  $P_q$  is based on max. junction temperature, using junction-case thermal resistance.

D. The value of  $R_{\theta JA}$  is measured with the device mounted on the minimum recommend pad size, in the still air environment with  $T_A=25^{\circ}\text{C}$ . The maximum allowed junction temperature of  $175^{\circ}\text{C}$ . The value in any given application depends on the user's specific board design.



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## ■ Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	100			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V			1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V			± 100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.7	3	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		8.5	11	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		12	16	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V		0.85	1.3	V
Gate resistance	R <sub>G</sub>	f=1MHz		1.3		Ω
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	1500	-	pF
Output Capacitance	C <sub>oss</sub>		-	800	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	80	-	
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =27.5A	-	27.9	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	5	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	7.8	-	
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =27.5A, di/dt=100A/us	-	60	-	nC
Reverse Recovery Time	t <sub>rr</sub>		-	44	-	ns
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =27.5A R <sub>GEN</sub> =2.2Ω	-	8.4	-	ns
Turn-on Rise Time	t <sub>r</sub>		-	56	-	
Turn-off Delay Time	t <sub>D(off)</sub>		-	24.4	-	
Turn-off fall Time	t <sub>f</sub>		-	7	-	



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## Typical Electrical and Thermal Characteristics Diagrams

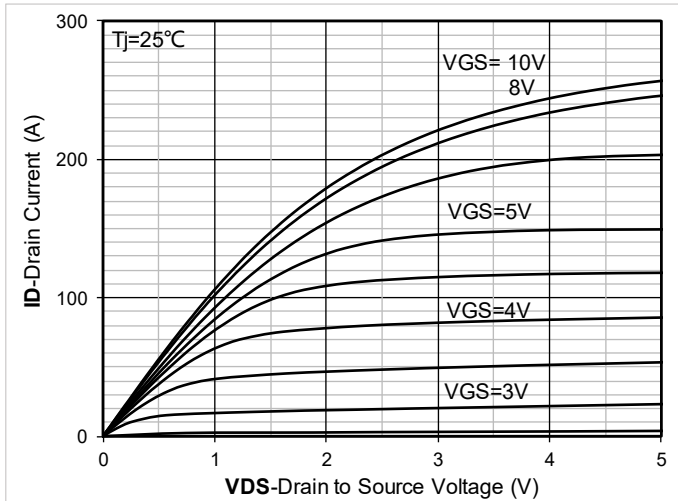


Figure 1. Output Characteristics

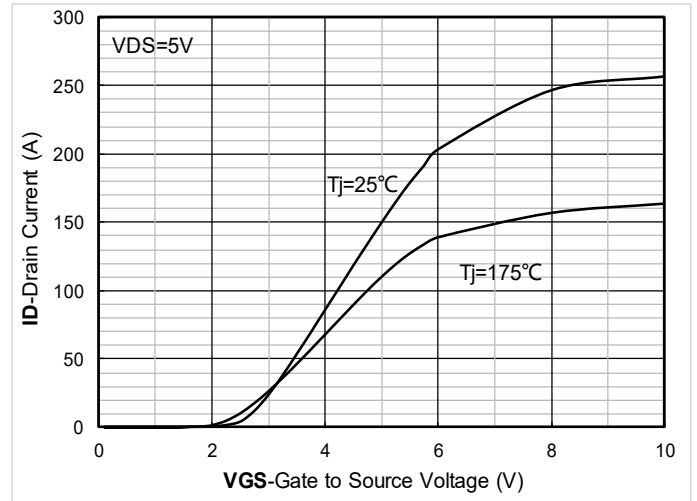


Figure 2. Transfer Characteristics

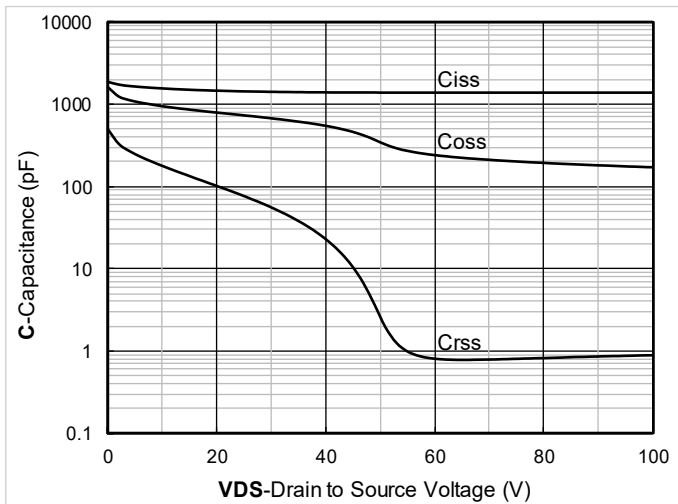


Figure 3. Capacitance Characteristics

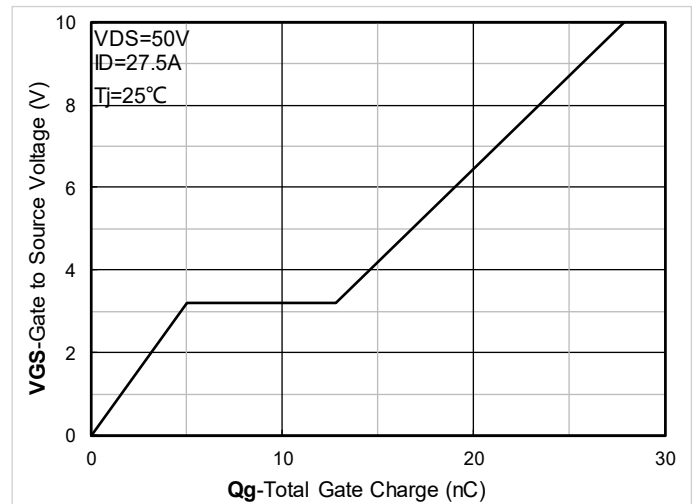


Figure 4. Gate Charge

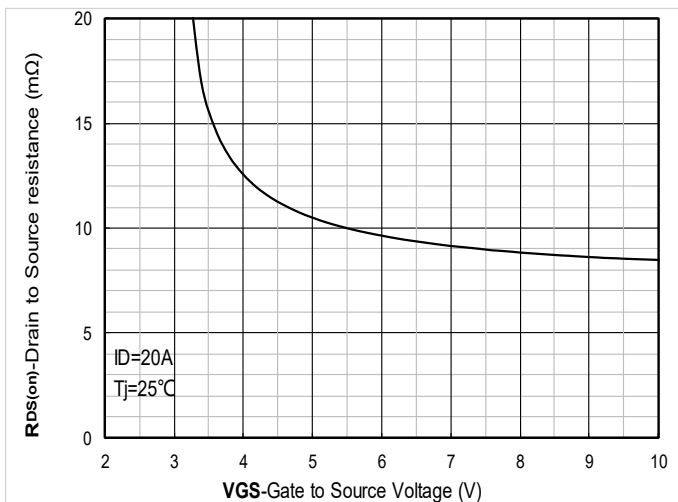


Figure 5. On-Resistance vs Gate to Source Voltage

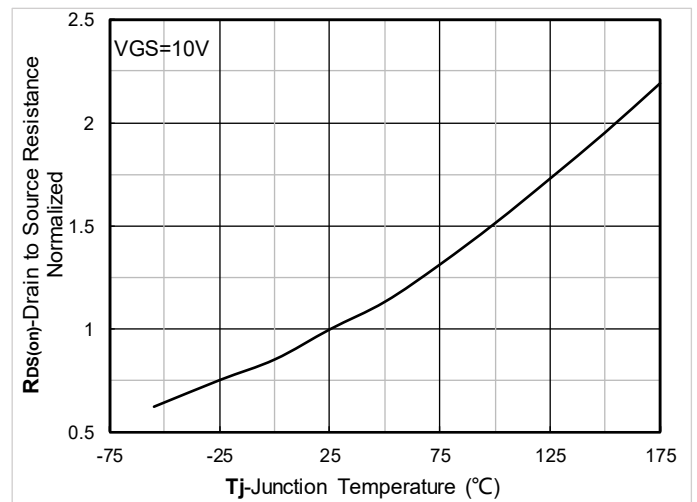


Figure 6. Normalized On-Resistance



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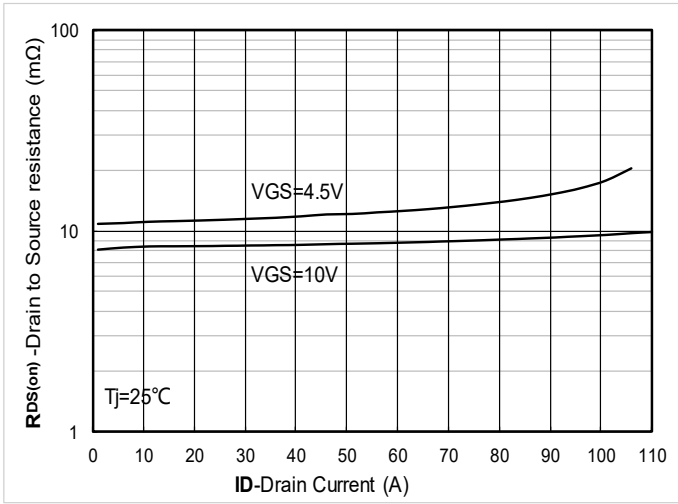


Figure 7.  $R_{DS(on)}$  VS Drain Current

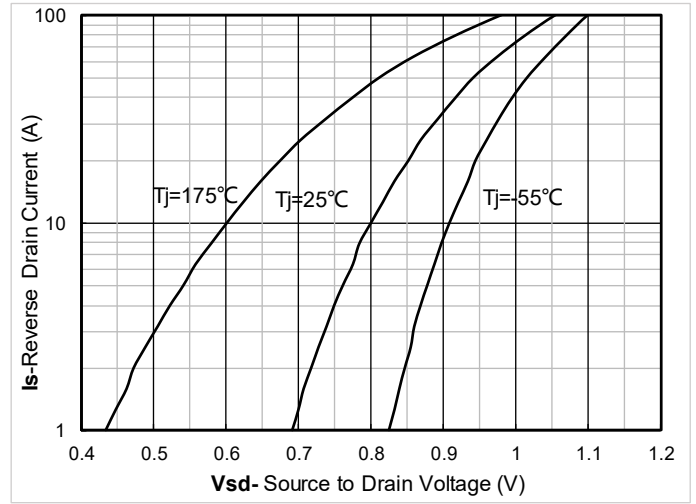


Figure 8. Forward characteristics of reverse diode

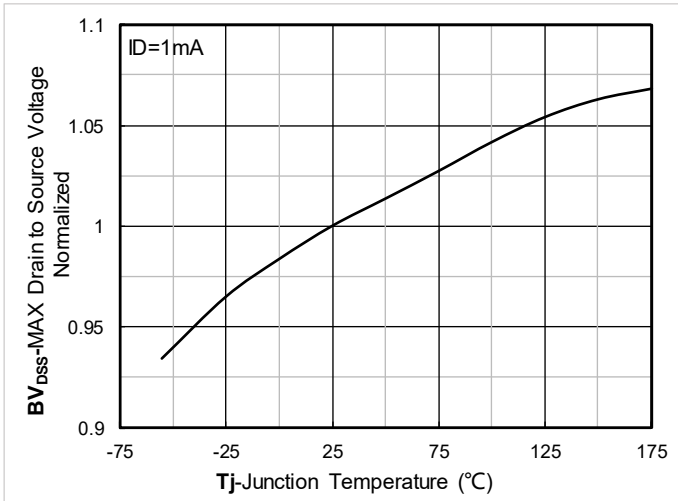


Figure 9. Normalized breakdown voltage

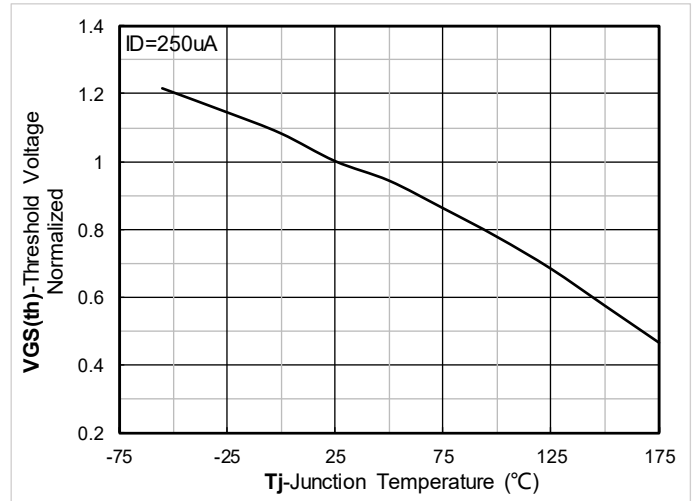


Figure 10. Normalized Threshold voltage

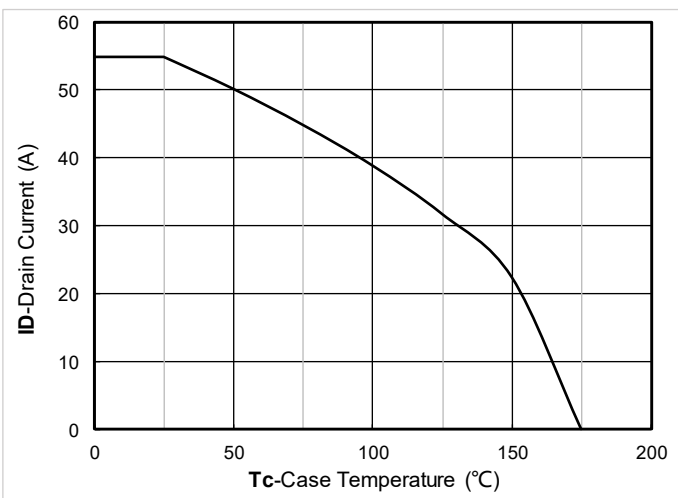


Figure 11. Current dissipation

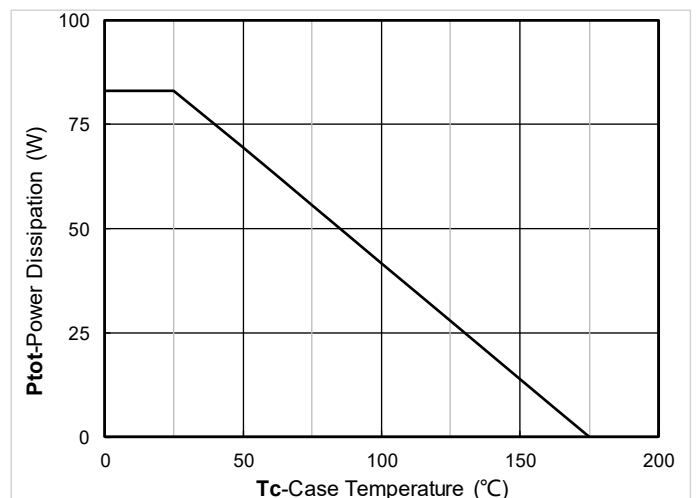


Figure 12. Power dissipation



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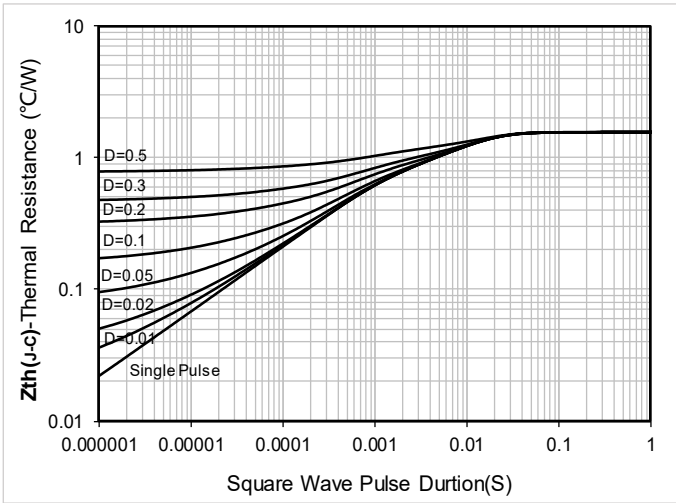


Figure 13. Maximum Transient Thermal Impedance

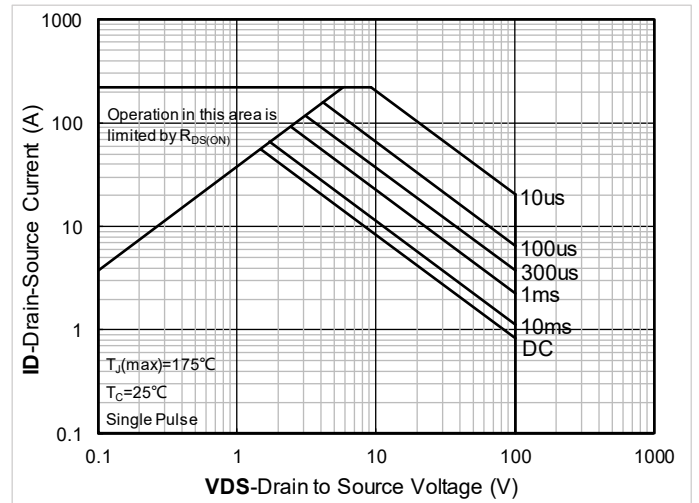
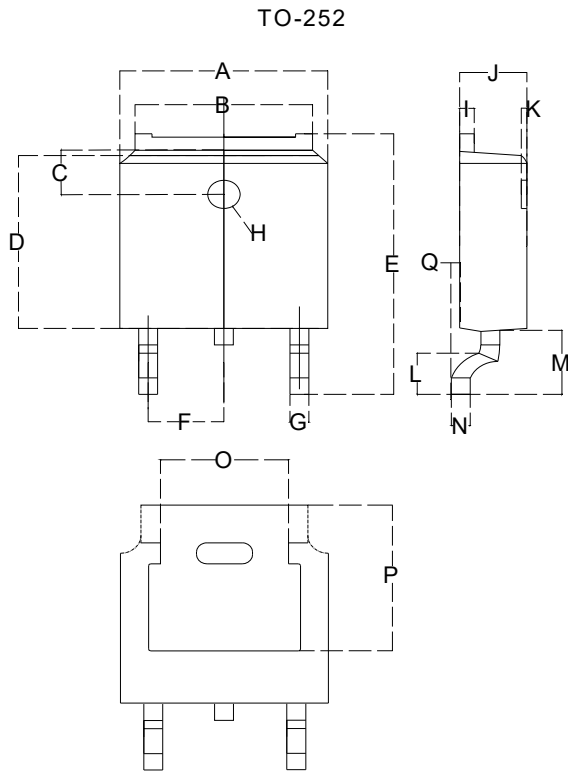


Figure 14. Safe Operation Area



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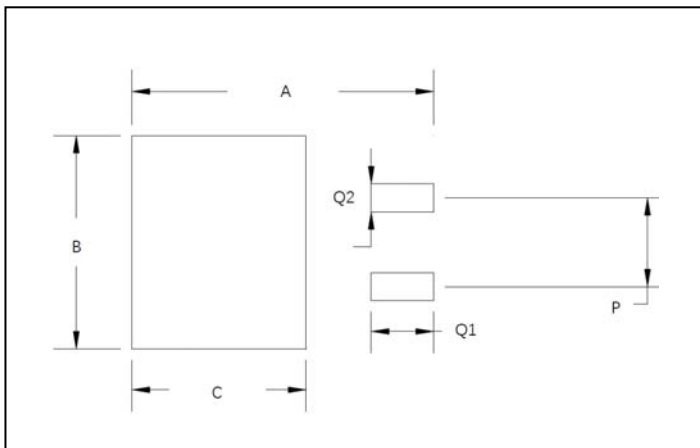
## ■ TO-252 Package information



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



## YJD55G10AQ

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