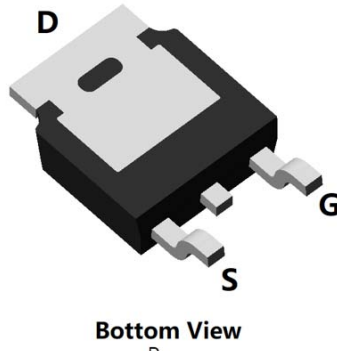
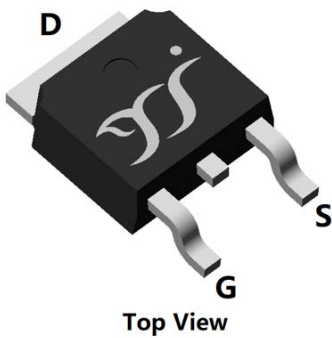
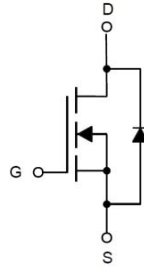


## N-Channel Enhancement Mode Field Effect Transistor



**TO-252**



### Product Summary

- $V_{DS}$  40V
- $I_D$  140A
- $R_{DS(on)}$  (at  $V_{GS}=10V$ ) <math><2.8m\Omega</math>
- 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
- Moisture Sensitivity Level 1
- 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 ( $T_A=25^\circ C$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	40	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	$T_C=25^\circ C$	$I_D$	140	A
	$T_C=100^\circ C$		99	
	$T_A=25^\circ C$		25	
	$T_A=100^\circ C$		17	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	400	A
Avalanche energy <sup>B</sup>		EAS	315	mJ
Total Power Dissipation <sup>C</sup>	$T_C=25^\circ C$	$P_D$	100	W
	$T_C=100^\circ C$		50	
	$T_A=25^\circ C$		3	
	$T_A=100^\circ C$		1.5	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+175	$^\circ C$



## YJD2D8G04HHQ

### ■ 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	$R_{\theta JC}$	1.2	1.5	

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD2D8G04HHQ	F1	YJD2D8G04H	2500	/	25000	13"Reel

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

B.  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=30\text{V}$ ,  $V_G=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=0.5\text{mH}$ ,  $I_{AS}=35.5\text{A}$ .

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.



# YJD2D8G04HHQ

## ■ 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	40			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, 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	2	3	4	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		2.2	2.8	mΩ
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V		0.8	1.2	V
Gate resistance	R <sub>G</sub>	f=1MHz		2		Ω
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	3344	-	pF
Output Capacitance	C <sub>oss</sub>		-	977	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	39	-	
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, I <sub>D</sub> =45A	-	42.2	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	15.4	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	9.4	-	
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =30A, di/dt=150A/us	-	40	-	nC
Reverse Recovery Time	t <sub>rr</sub>		-	38	-	ns
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =20V, I <sub>D</sub> =45A R <sub>GEN</sub> =2.2Ω	-	20.3	-	ns
Turn-on Rise Time	t <sub>r</sub>		-	209	-	
Turn-off Delay Time	t <sub>D(off)</sub>		-	25	-	
Turn-off fall Time	t <sub>f</sub>		-	12.3	-	



# YJD2D8G04HHQ

## Typical Electrical and Thermal Characteristics Diagrams

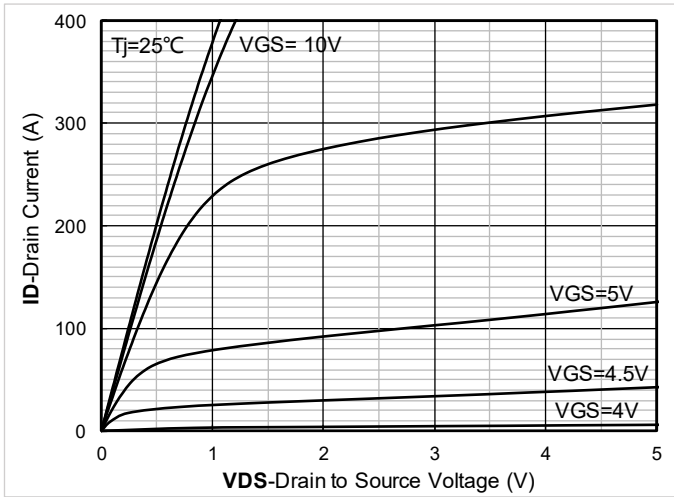


Figure 1. Output Characteristics

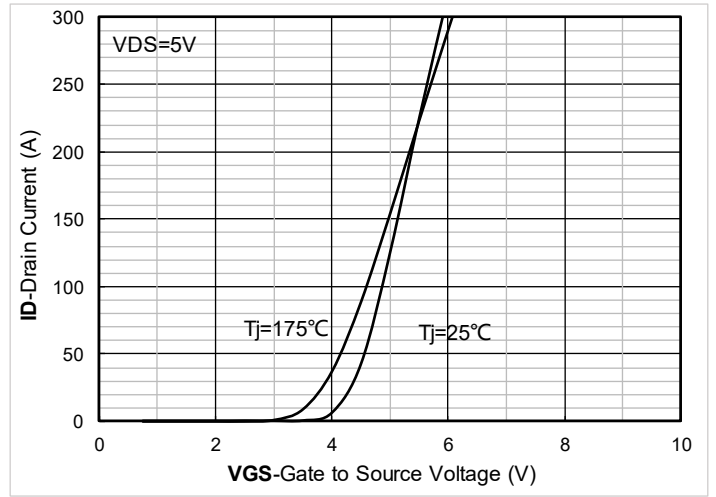


Figure 2. Transfer Characteristics

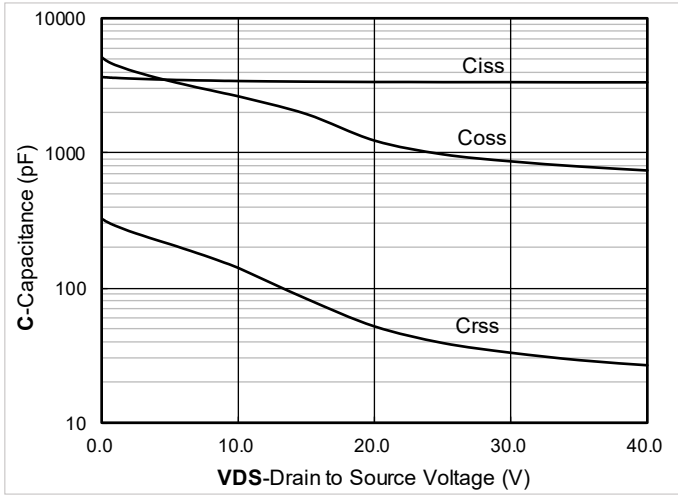


Figure 3. Capacitance Characteristics

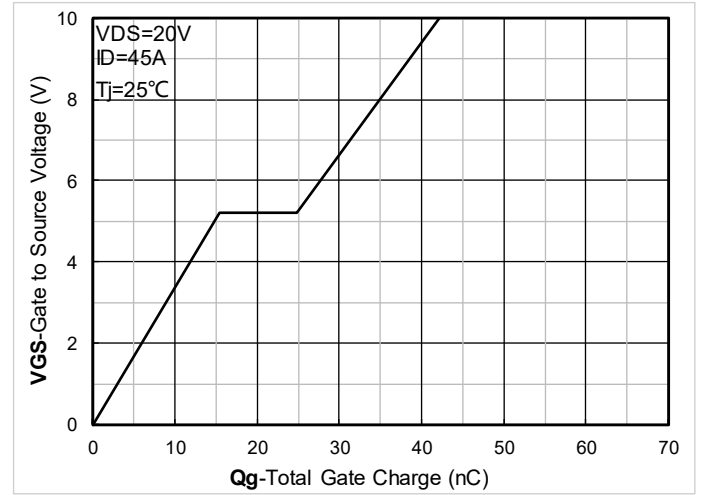


Figure 4. Gate Charge

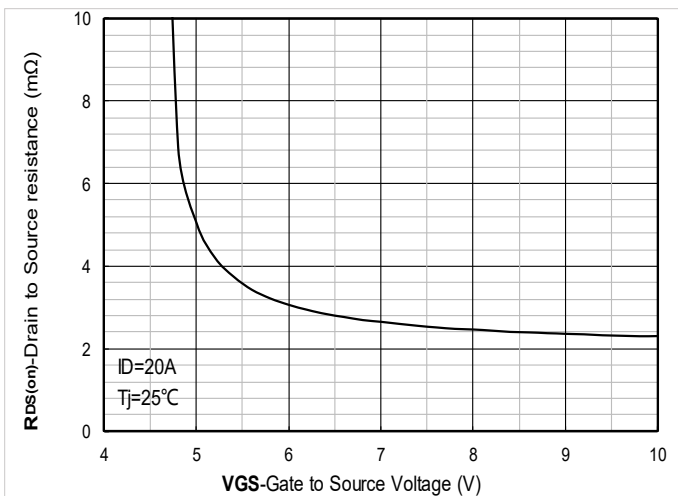


Figure 5. On-Resistance vs Gate to Source Voltage

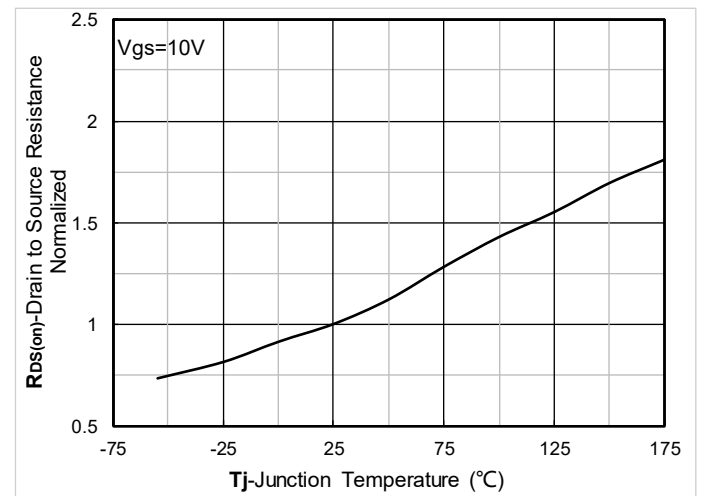


Figure 6. Normalized On-Resistance



# YJD2D8G04HHQ

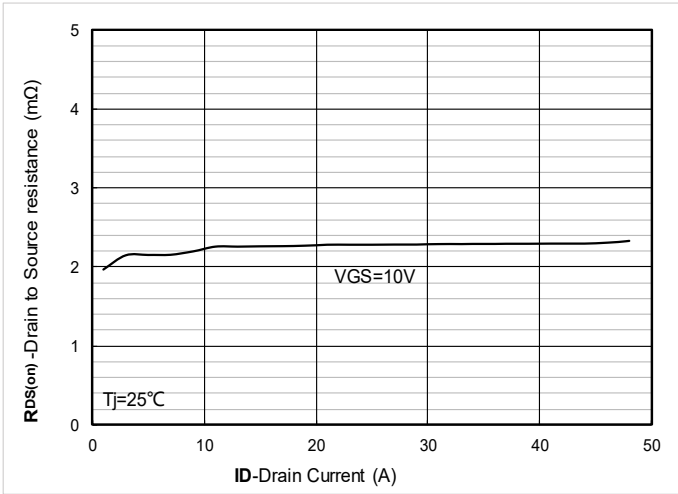


Figure 7. RDS(on) VS Drain Current

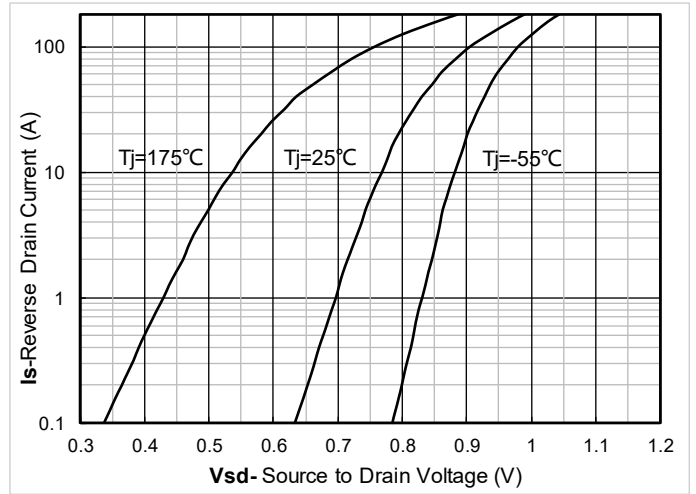


Figure 8. Forward characteristics of reverse diode

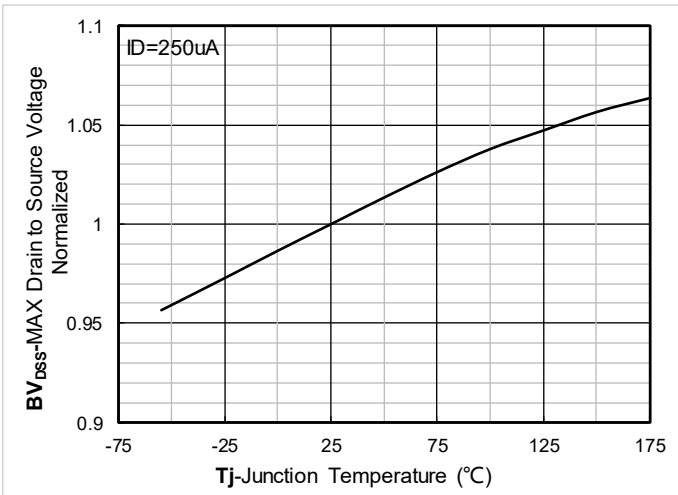


Figure 9. Normalized breakdown voltage

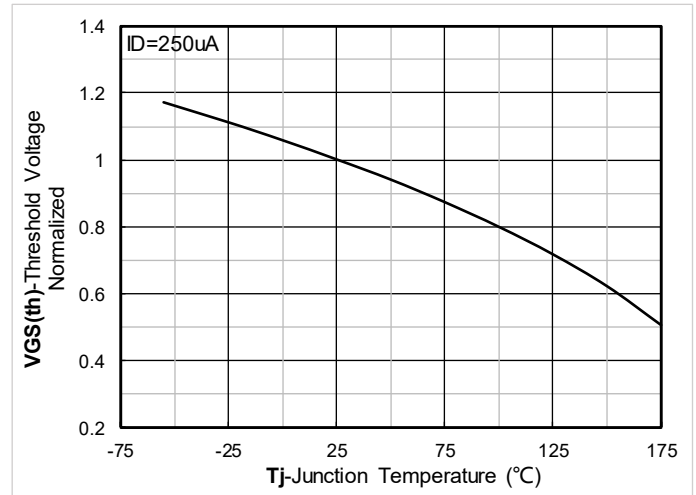


Figure 10. Normalized Threshold voltage

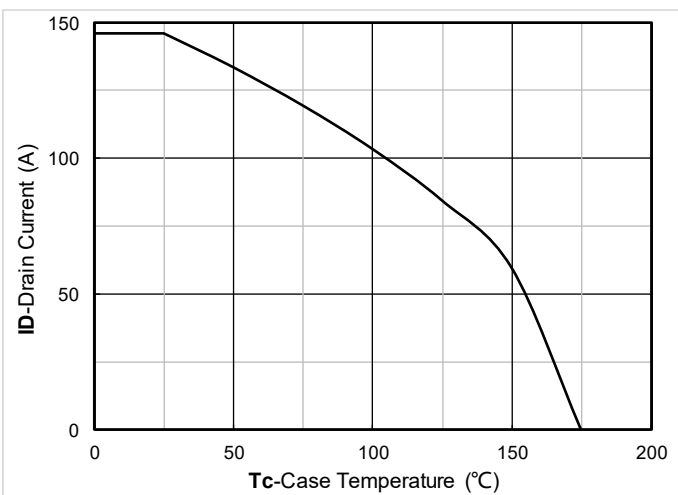


Figure 11. Current dissipation

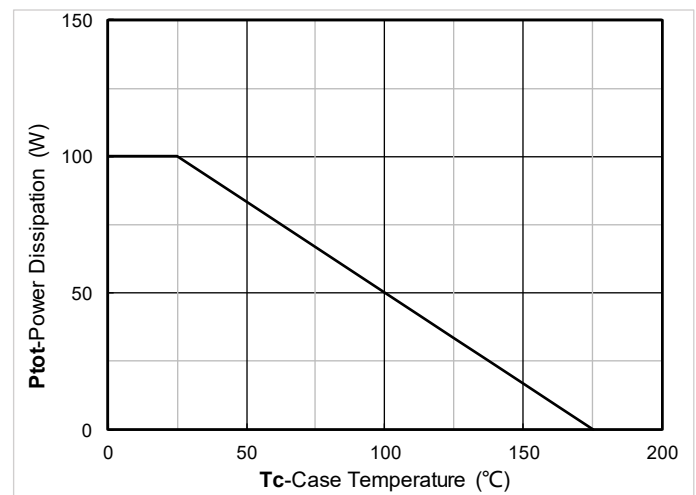


Figure 12. Power dissipation



# YJD2D8G04HHQ

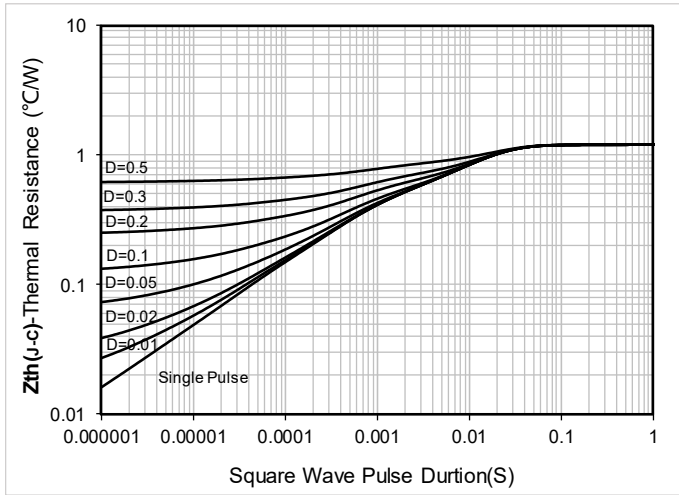


Figure 13. Maximum Transient Thermal Impedance

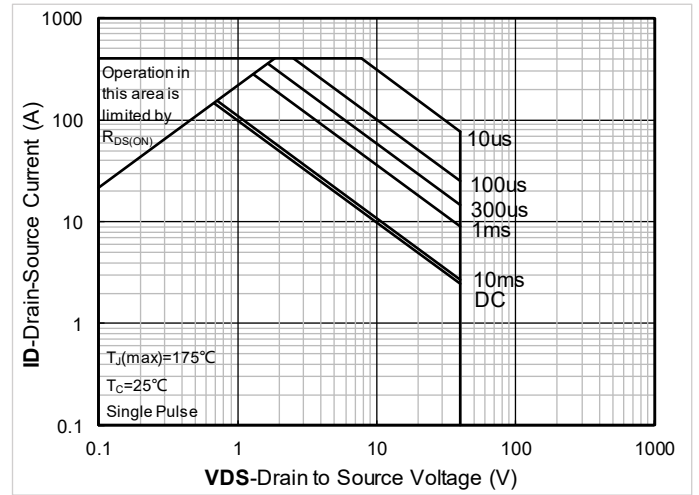
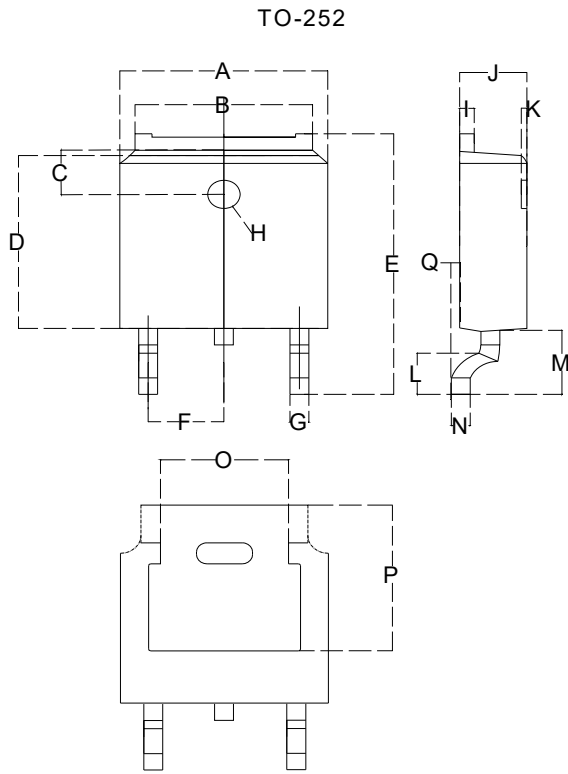


Figure 14. Safe Operation Area



# YJD2D8G04HHQ

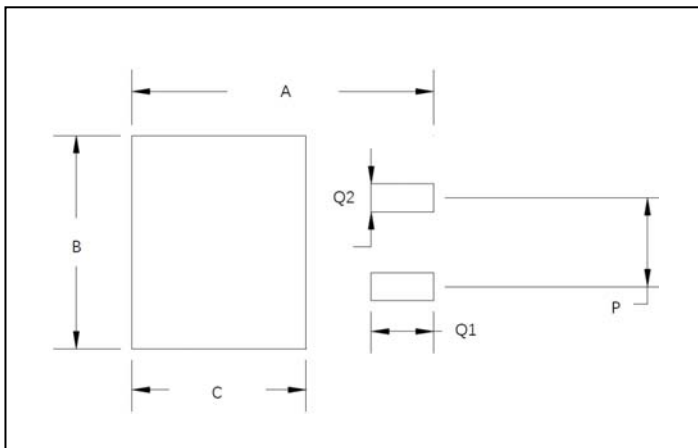
## ■ TO-252 Package information



Dimensions in millimeters

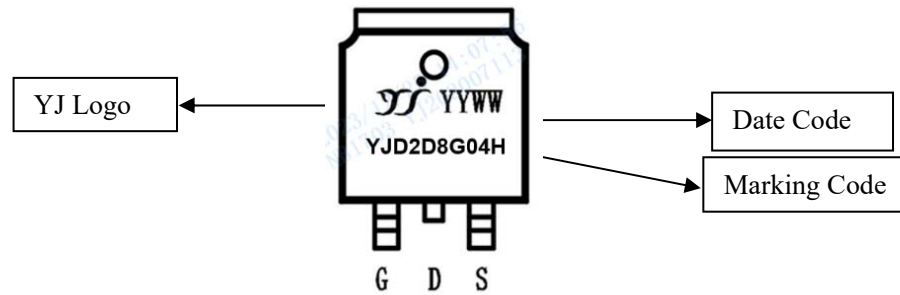
TO-252		
Dim	Min	Max
A	6.500	6.700
B	5.100	5.460
C	1.400	1.800
D	6.000	6.200
E	10.000	10.400
F	2.166	2.366
G	0.660	0.860
H	Φ1.050	Φ1.350
I	0.460	0.580
J	2.200	2.400
K	0	0.300
L	0.890	2.290
M	2.730	3.080
N	0.430	0.580
O	3.800	4.500
P	5.15	5.45
Q	0	0.2

## ■ Suggested Pad Layout



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

## ■ Marking Information



**Note:**

1. All marking is at middle of the product body
2. All marking is in laser printing
3. YJD2D8G04H is Marking Code, YYWW is date code, "YY" is year, "WW" is week
4. Body color: Black





## YJD2D8G04HHQ

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