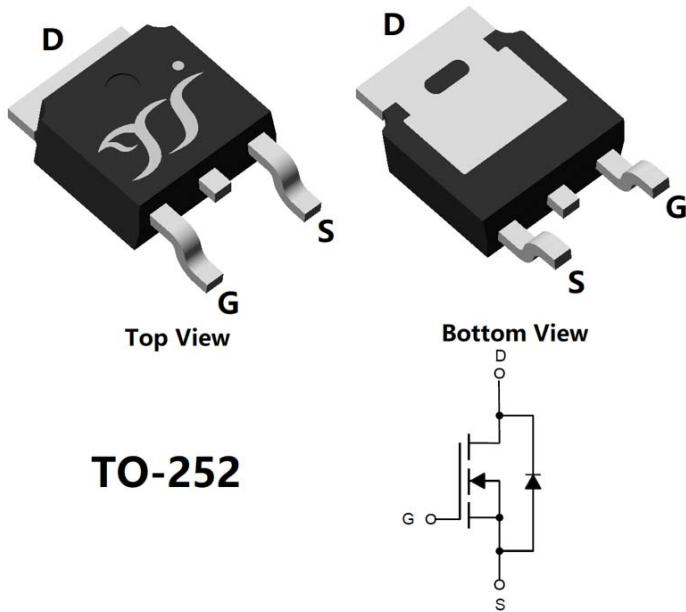


N-Channel Enhancement Mode Field Effect Transistor



TO-252

Product Summary

- V_{DS} 40V
- I_D 40A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $<13.0m\Omega$
- $R_{DS(ON)}$ (at $V_{GS}=4.5V$) $<23.0m\Omega$
- 100% EAS Tested
- 100% ∇V_{DS} Tested

General Description

- Trench Power LV MOSFET technology
- High density cell design for low $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Halogen Free
- 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}	± 20	V
Drain Current	$T_A=25^\circ C$	I_D	12	A
	$T_A=100^\circ C$		7.7	
	$T_C=25^\circ C$		40	
	$T_C=100^\circ C$		25	
Pulsed Drain Current ^A		I_{DM}	100	A
Avalanche energy ^B		EAS	49	mJ
Total Power Dissipation ^C	$T_A=25^\circ C$	P_D	2.5	W
	$T_A=100^\circ C$		1	
	$T_C=25^\circ C$		28	
	$T_C=100^\circ C$		11	
Thermal Resistance Junction-to-Case		$R_{\theta JC}$	4.4	$^\circ C/W$
Thermal Resistance Junction-to-Ambient ^D		$R_{\theta JA}$	50	$^\circ C/W$
Junction and Storage Temperature Range		T_J, T_{STG}	-55~+150	$^\circ C$

■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJD40N04AQ	F1	YJD40N04A	2500	/	25000	13"Reel



YJD40N04AQ

■ 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		8.6	13	mΩ
		V _{GS} =4.5V, I _D =10A		15	23	
Diode Forward Voltage	V _{SD}	I _S =20A, V _{GS} =0V			1.2	V
Gate resistance	R _G	f=1MHz, Open drain		2.7		Ω
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1MHz	-	1000	-	pF
Output Capacitance	C _{oss}		-	112	-	
Reverse Transfer Capacitance	C _{rss}		-	90	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =10V, V _{DS} =20V, I _D =20A	-	23	-	nC
Gate-Source Charge	Q _{gs}		-	3.5	-	
Gate-Drain Charge	Q _{gd}		-	6	-	
Reverse Recovery Charge	Q _{rr}	I _F =20A, di/dt=300A/us	-	10	-	nC
Reverse Recovery Time	t _{rr}		-	12.5	-	ns
Turn-on Delay Time	t _{D(on)}	V _{GS} =10V, V _{DD} =20V, I _D =20A	-	3.8	-	ns
Turn-on Rise Time	t _r		-	58	-	
Turn-off Delay Time	t _{D(off)}		-	20	-	
Turn-off fall Time	t _f		-	2.5	-	

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

B. T_J=25°C, V_{DD}=40V, V_G=10V, R_G=25Ω, L=0.5mH, I_{AS}=14A.

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

D. The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, 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.



YJD40N04AQ

■ Typical Electrical and Thermal Characteristics Diagrams

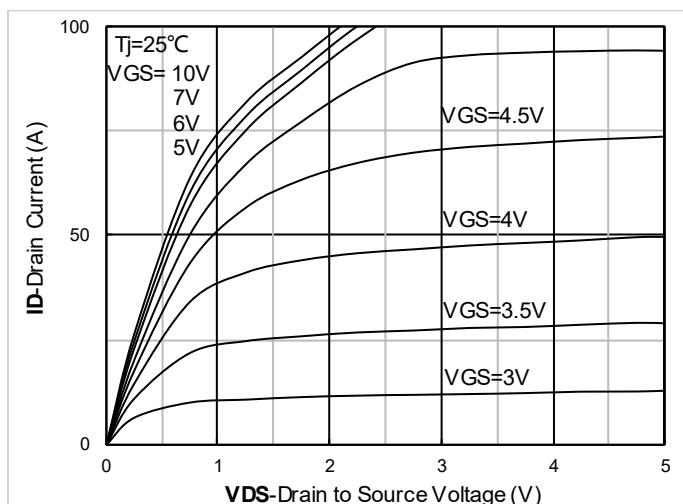


Figure 1. Output Characteristics

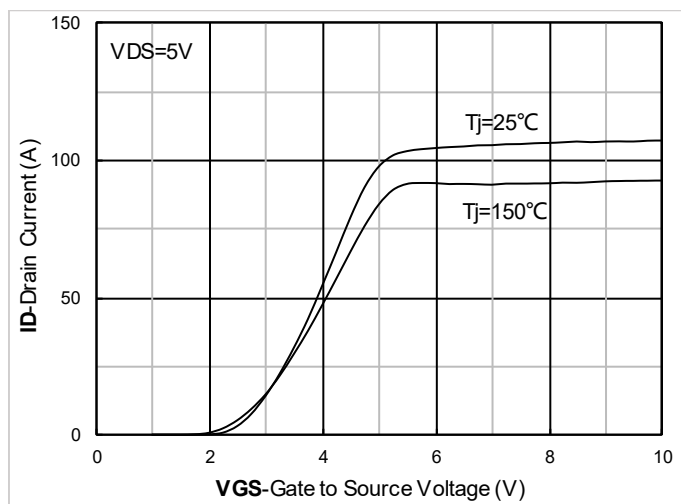


Figure 2. Transfer Characteristics

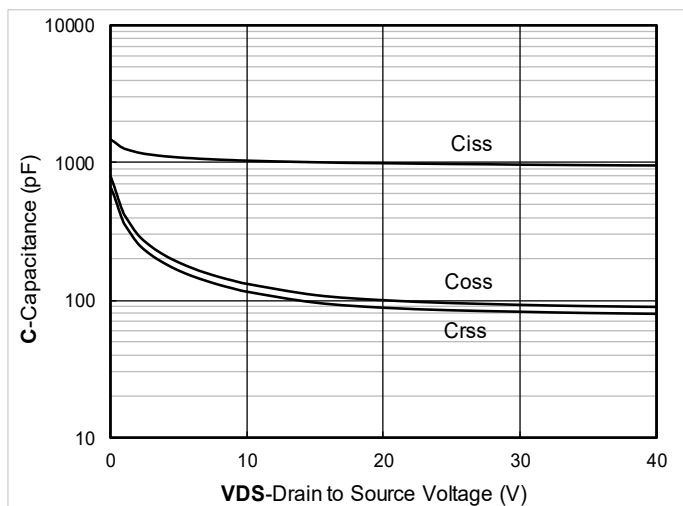


Figure 3. Capacitance Characteristics

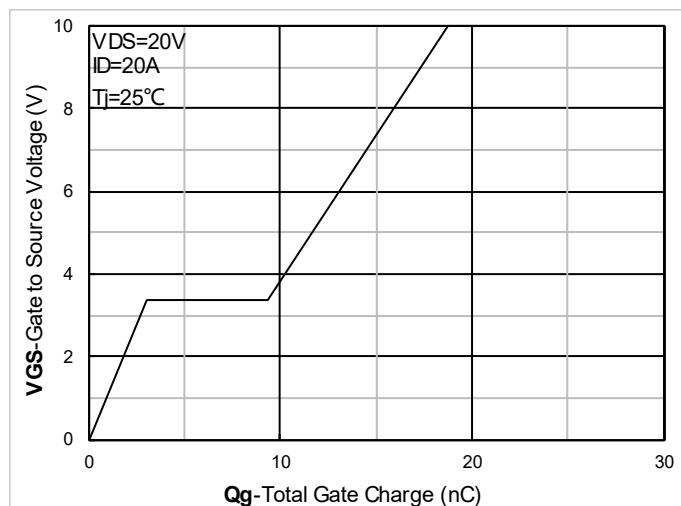


Figure 4. Gate Charge

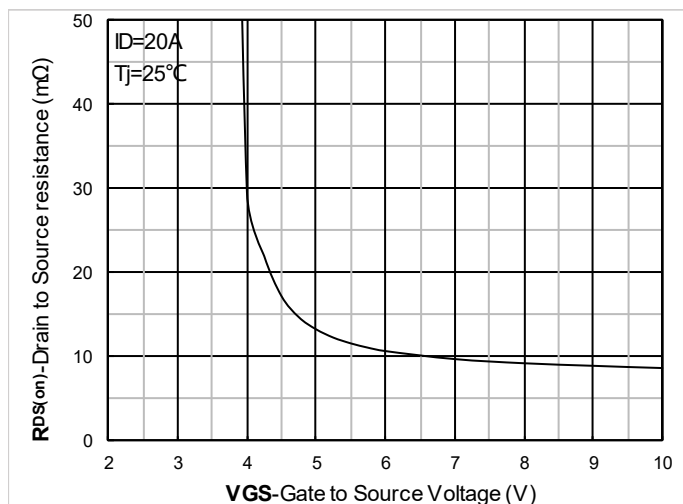


Figure 5. On-Resistance vs Gate to Source Voltage

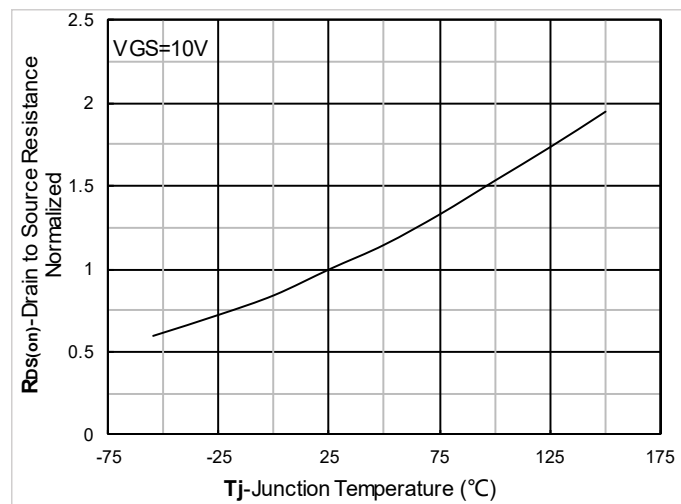


Figure 6. Normalized On-Resistance

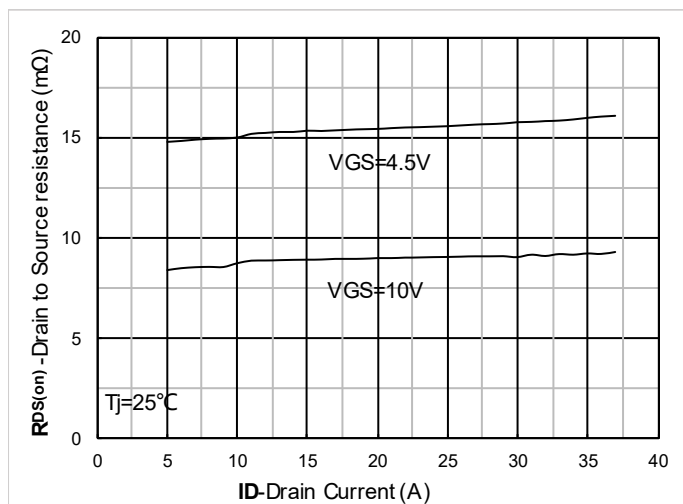


Figure 7. $R_{DS(on)}$ VS Drain Current

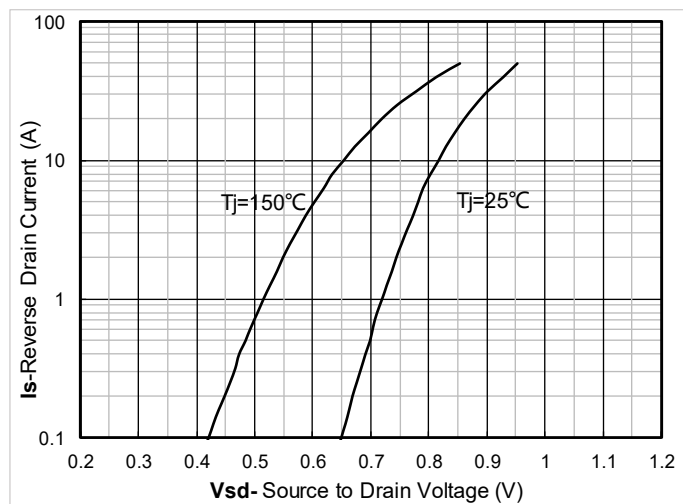


Figure 8. Forward characteristics of reverse diode

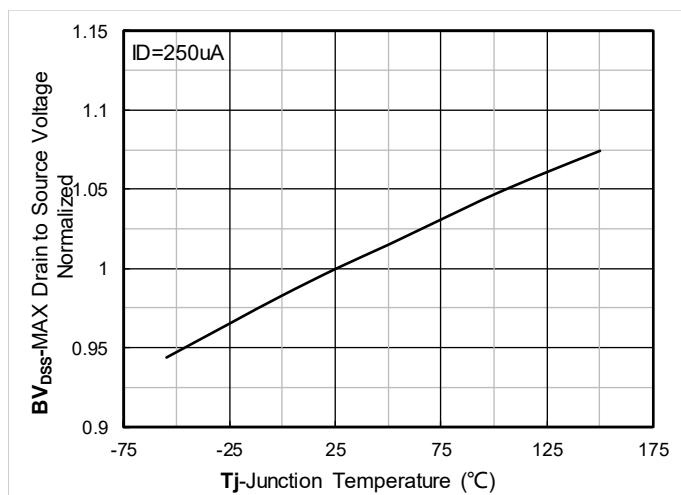


Figure 9. Normalized breakdown voltage

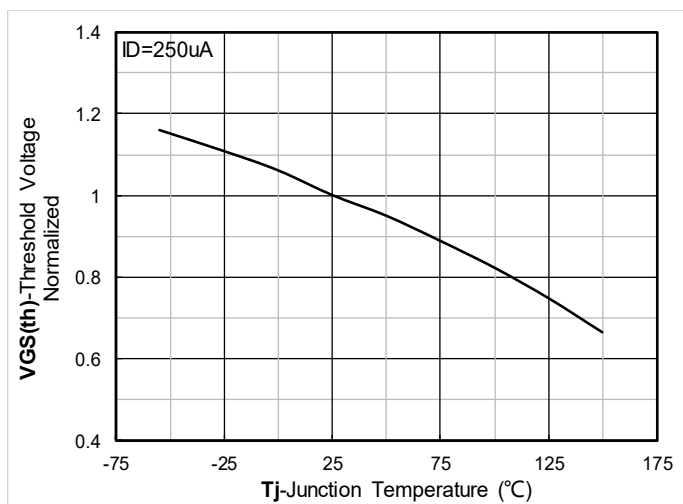


Figure 10. Normalized Threshold voltage

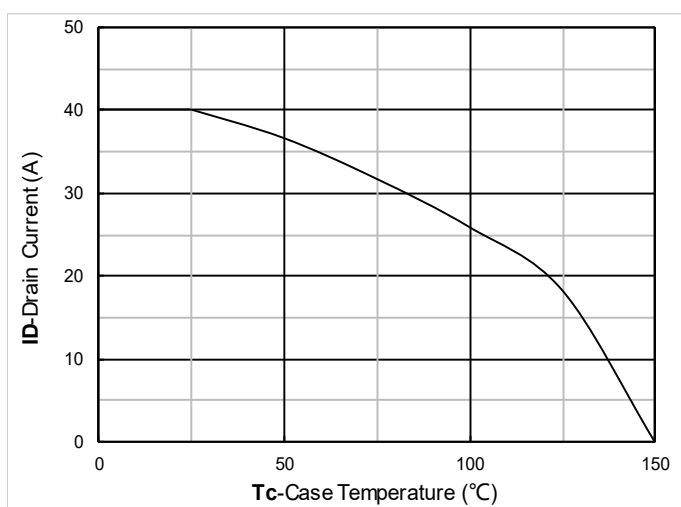


Figure 11. Current dissipation

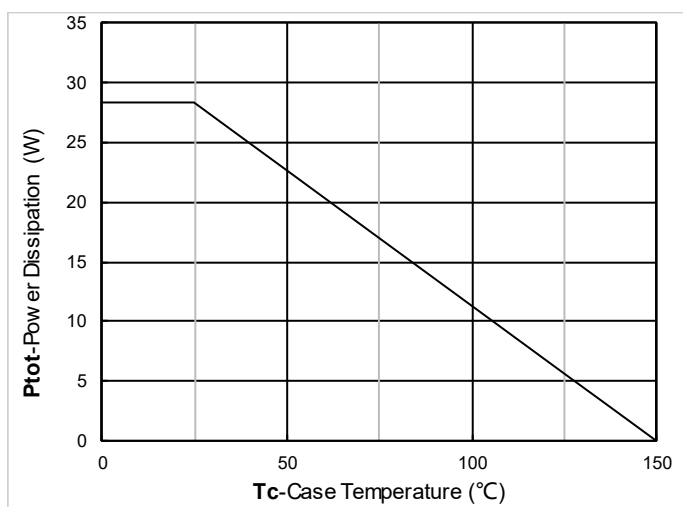


Figure 12. Power dissipation

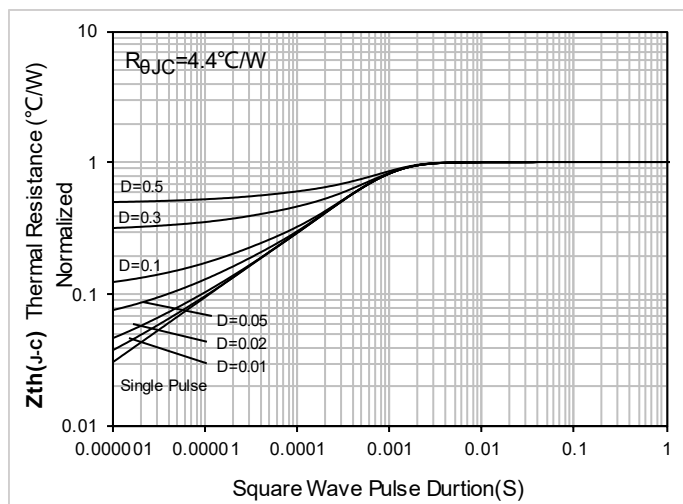


Figure 13. Maximum Transient Thermal Impedance

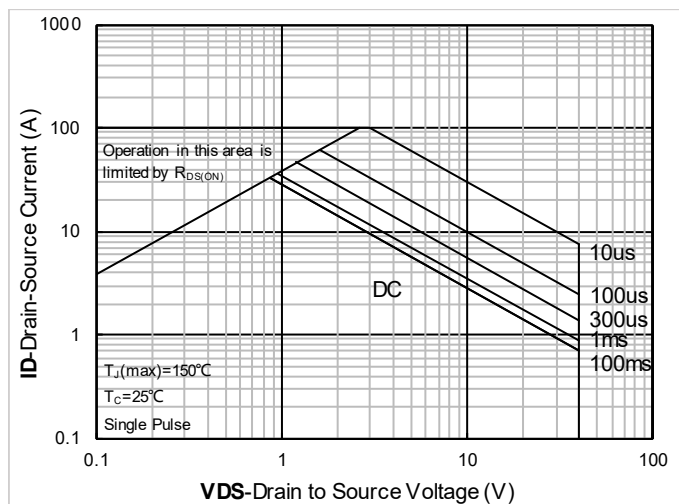
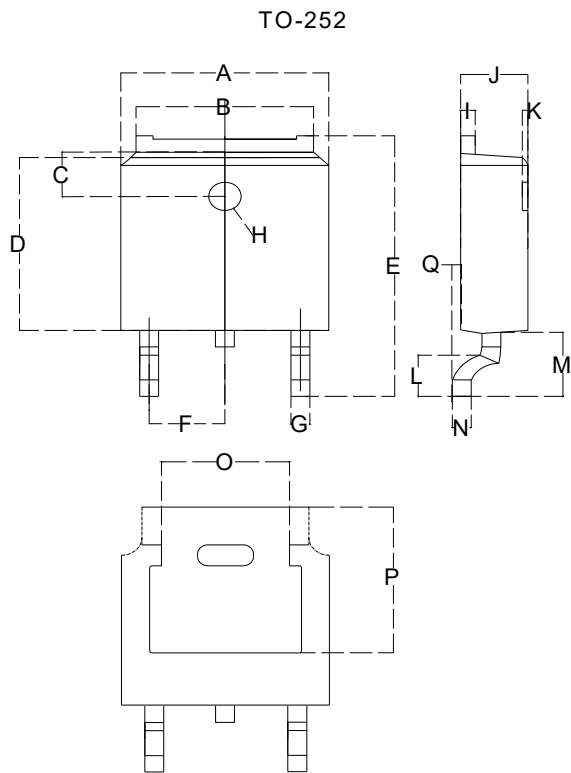


Figure 14. Safe Operation Area



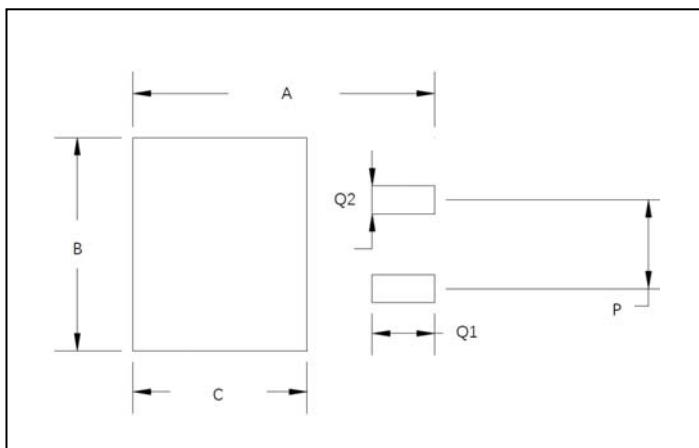
■ TO-252 Package information



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	$\Phi 1.050$	$\Phi 1.350$
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

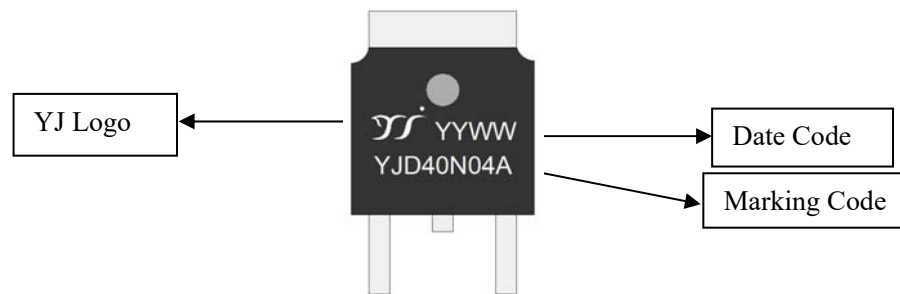


Dim	Millimeters
A	11.4
B	6.74
C	6.23
P	4.56
Q1	2.28
Q2	1.52



YJD40N04AQ

■ Marking Information



Note:

1. All marking is at middle of the product body
2. All marking is in laser printing
3. YJD40N04A is Marking Code, YYWW is date code, "YY" is year, "WW" is week
4. Body color: Black



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