优尚

YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_C = +25°C
80V	16mΩ @ V_{GS} = 10V	50A
	21mΩ @ V_{GS} = 4.5V	43A

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- Low $R_{DS(ON)}$ – Ensures On-State Losses are Minimized
- High Conversion Efficiency
- Low Input Capacitance
- Fast Switching Speed

Description and Applications

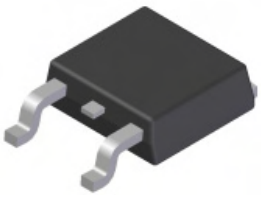
This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AECQ101, supported by a PPAP and is ideal for use in:

- Engine Management Units
- Motor Control
- DC-DC Converters

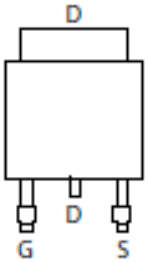
Mechanical Data

- Case: TO252 (DPAK)
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (Approximate)

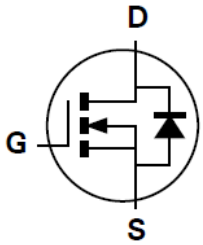
TO252 (DPAK)



Top View



Pin Out Top View



Equivalent Circuit

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Drain-Source Voltage		V_{DSS}	80	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note 7) V_{GS} = 10V	T_C = +25°C T_C = +100°C	I_D	50 35	A
Maximum Continuous Body Diode Forward Current (Note 7)		I_S	80	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)		I_{DM}	80	A
Avalanche Energy, L = 60mH		E_{AS}	147	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 6)	P_D	2.6	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	47	°C/W
Total Power Dissipation (Note 7)	P_D	60	W
Thermal Resistance, Junction to Case (Note 7)	$R_{\theta JC}$	2.5	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +175	°C

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.
7. Device mounted on infinite heat sink and measured by thermal couple attached on bottom heat sink of package.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	80	—	—	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 64V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	12.1	16	mΩ	V_{GS} = 10V, I_D = 12A
		—	14.8	21		V_{GS} = 4.5V, I_D = 6A
Diode Forward Voltage	V_{SD}	—	0.9	1.2	V	V_{GS} = 0V, I_S = 25A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	2051	—	pF	V_{DS} = 40V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	189.9	—		
Reverse Transfer Capacitance	C_{rss}	—	24.6	—		
Gate Resistance	R_g	—	0.44	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	24.1	—	nC	V_{DS} = 40V, I_D = 12A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	46.8	—		
Gate-Source Charge	Q_{gs}	—	6.9	—		
Gate-Drain Charge	Q_{gd}	—	12.2	—		
Turn-On Delay Time	$t_{D(ON)}$	—	5.8	—	nS	V_{DD} = 40V, V_{GS} = 10V, I_D = 12A, R_G = 1.6Ω
Turn-On Rise Time	t_R	—	6.5	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	17.3	—		
Turn-Off Fall Time	t_F	—	4.7	—		
Body Diode Reverse Recovery Time	t_{RR}	—	33.5	—	nS	I_F = 12A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q_{RR}	—	38.9	—	nC	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

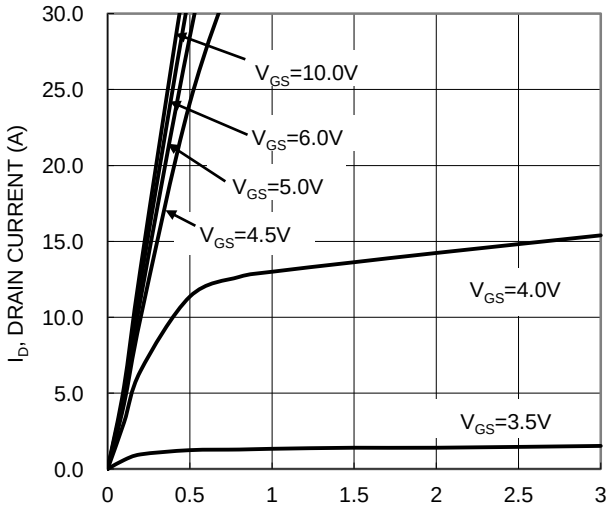


Figure 1. Typical Output Characteristic

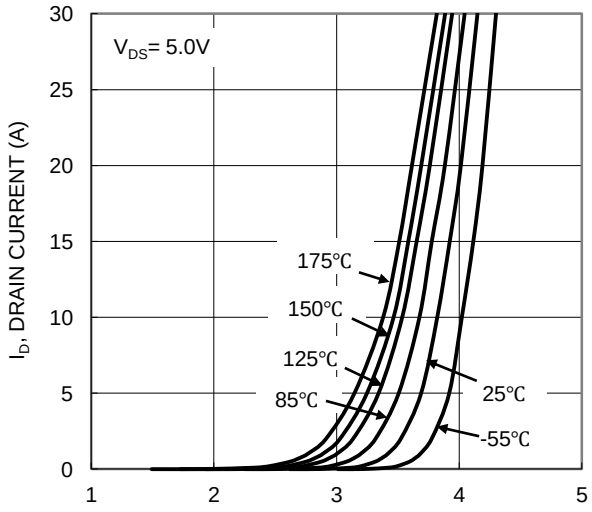


Figure 2. Typical Transfer Characteristic

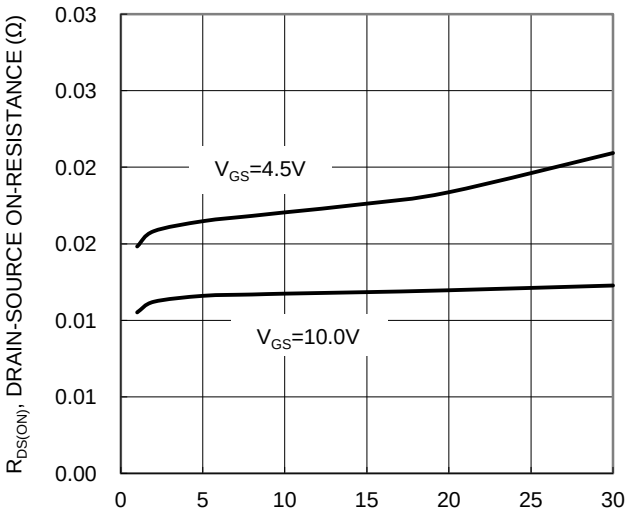


Figure 3. Typical On-Resistance vs Drain Current and Gate Voltage

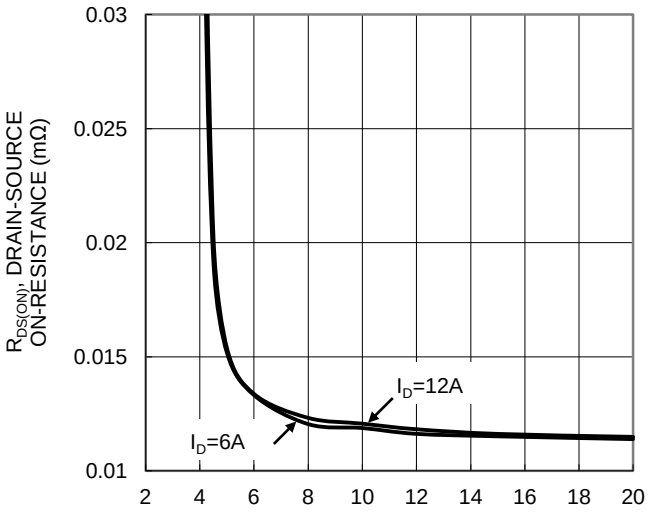


Figure 4. Typical Transfer Characteristic

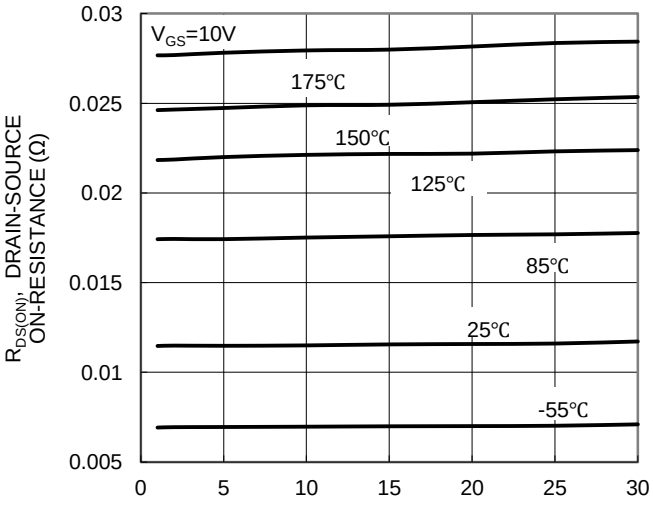


Figure 5. Typical On-Resistance vs Drain Current and Temperature

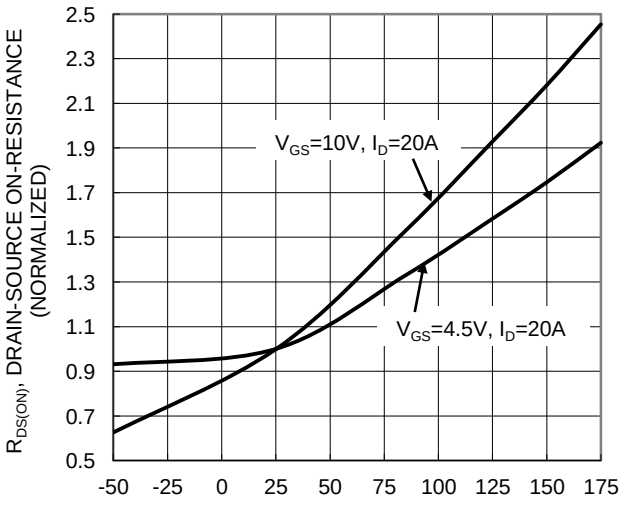


Figure 6. On-Resistance Variation with Temperature

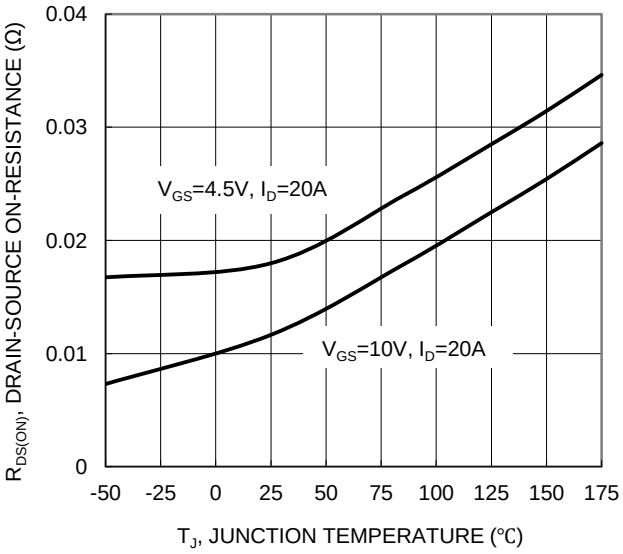


Figure 7. On-Resistance Variation with Temperature

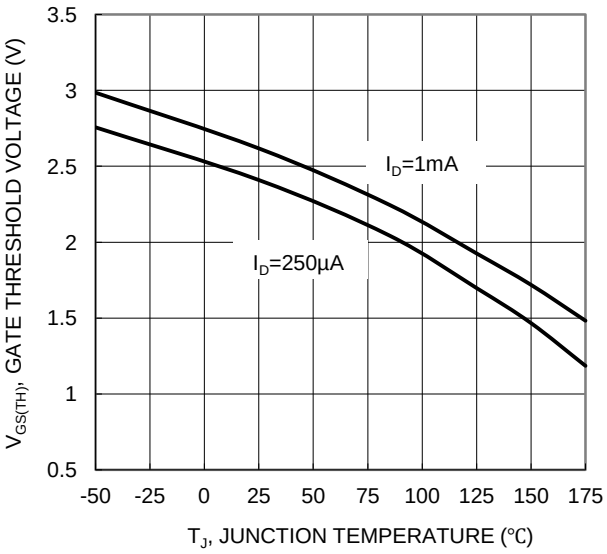


Figure 8. Gate Threshold Variation vs Temperature

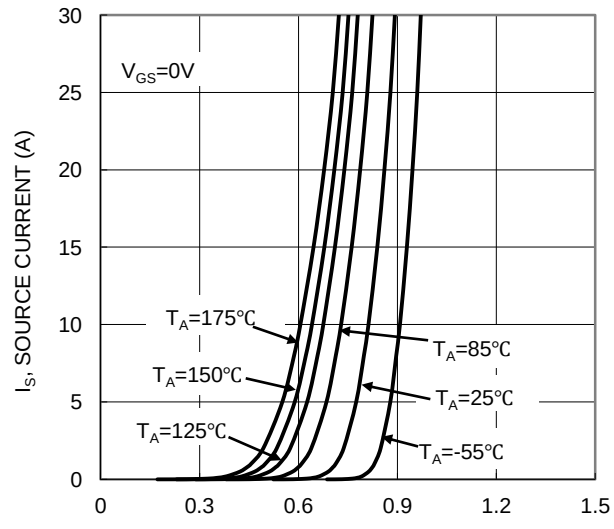


Figure 9. Diode Forward Voltage vs Current

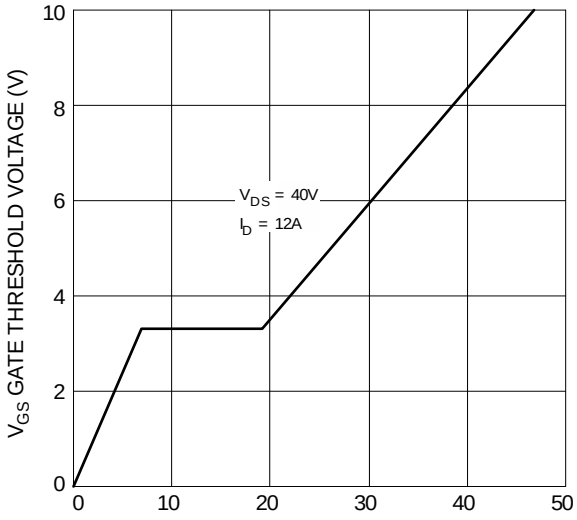


Figure 10 Gate Charge

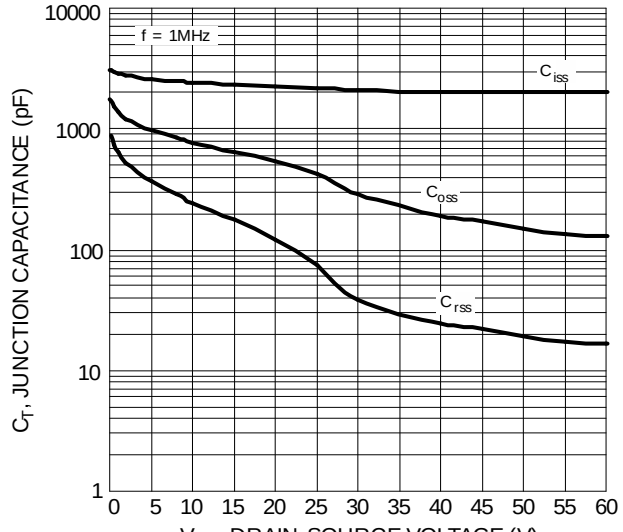


Figure 11 Typical Junction Capacitance

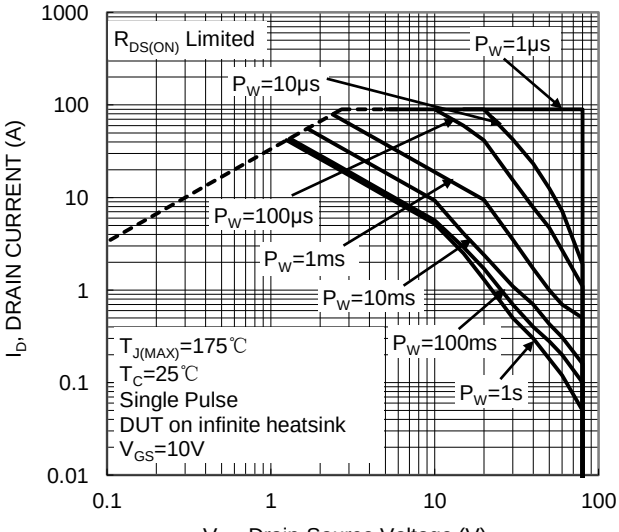


Figure 12. SOA, Safe Operation Area

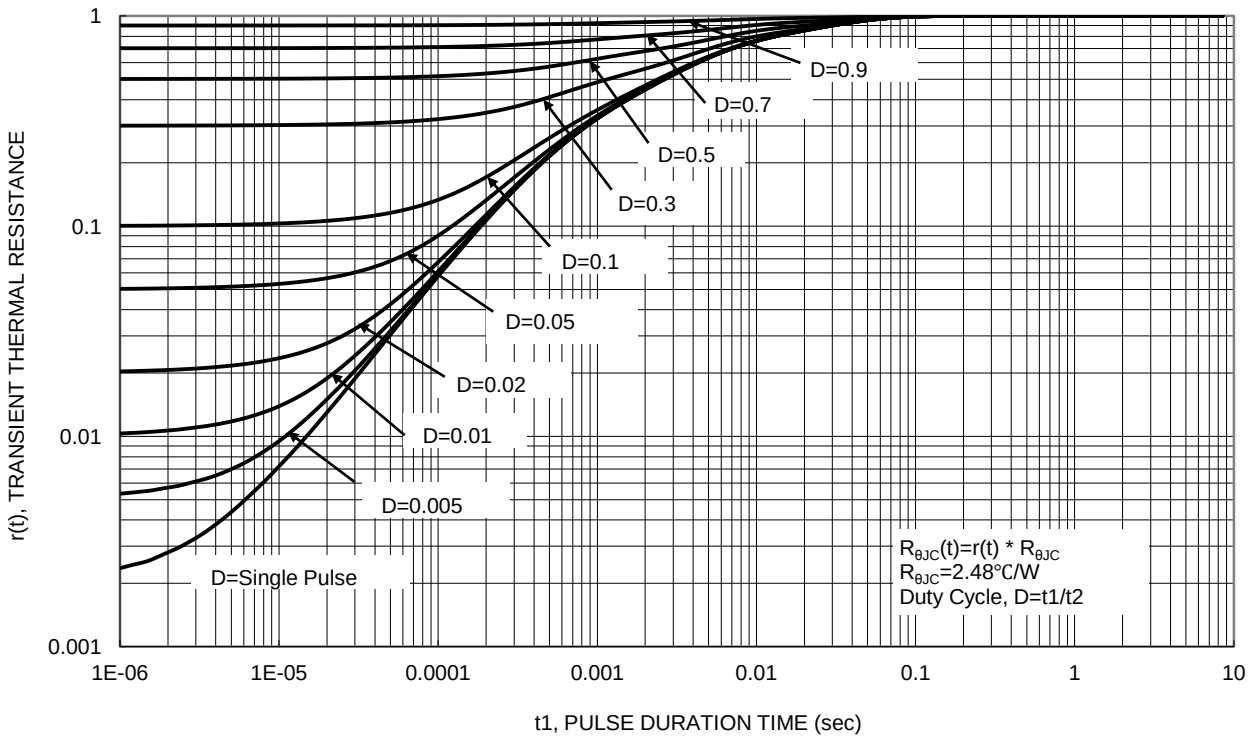
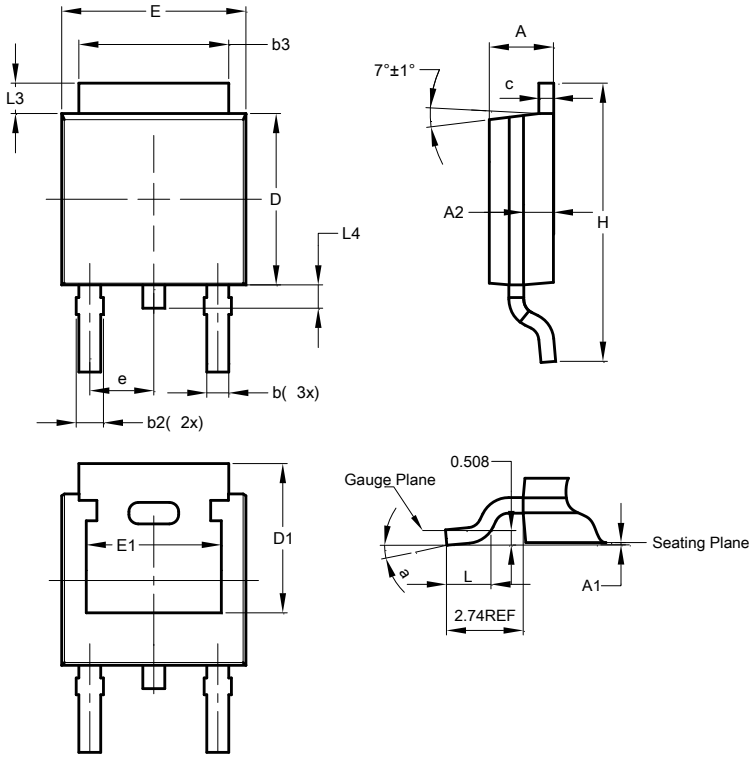


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

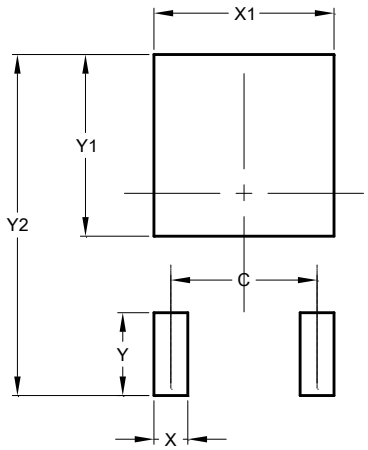
TO252 (DPAK)



TO252 (DPAK)			
Dim	**Min**	**Max**	**Typ**
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	—	—
e	—	—	2.286
E	6.45	6.70	6.58
E1	4.32	—	—
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	—
All Dimensions in mm			

Suggested Pad Layout

TO252 (DPAK)



Dimensions	Value (in mm)
C	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700