



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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企业微信二维码



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Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D Max $T_C = +25^\circ\text{C}$
-60V	33m Ω @ $V_{GS} = -10V$	-35A
	40m Ω @ $V_{GS} = -4.5V$	-32A

Description

This MOSFET has been designed to meet the stringent requirements of Automotive applications.

Applications

It is qualified to AECQ101, supported by a PPAP and is ideal for use in:

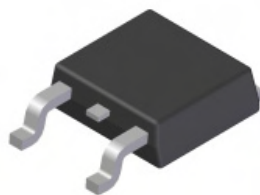
- Engine Management Systems
- Body Control Electronics
- DCDC Converters

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low On-Resistance
- Low Input Capacitance

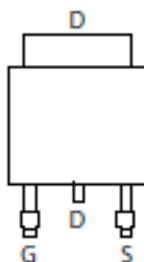
Mechanical Data

- 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 Connections: See Diagram
- Weight: 0.33 grams (Approximate)

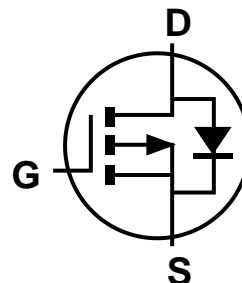


Top View

TO252 (DPAK)



Pin Out Top View



Equivalent Circuit

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-60	V
Gate-Source Voltage			V_{GSS}	± 20	V
Continuous Drain Current (Note 6) $V_{GS} = -10\text{V}$	Steady State	$T_C = +25^\circ\text{C}$ $T_C = +100^\circ\text{C}$	I_D	-35 -27	A
	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-7.3 -6.1	A
Pulsed Drain Current (380 μs pulse, duty cycle = 1%)			I_{DM}	-60	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-2.2	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			I_{AS}	-35	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			E_{AS}	60	mJ

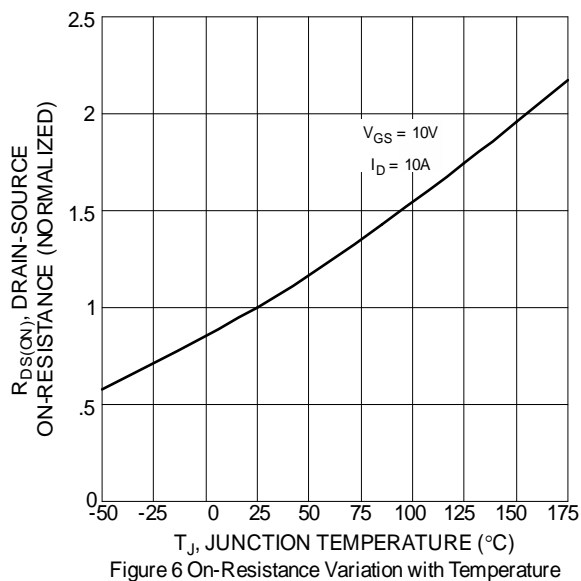
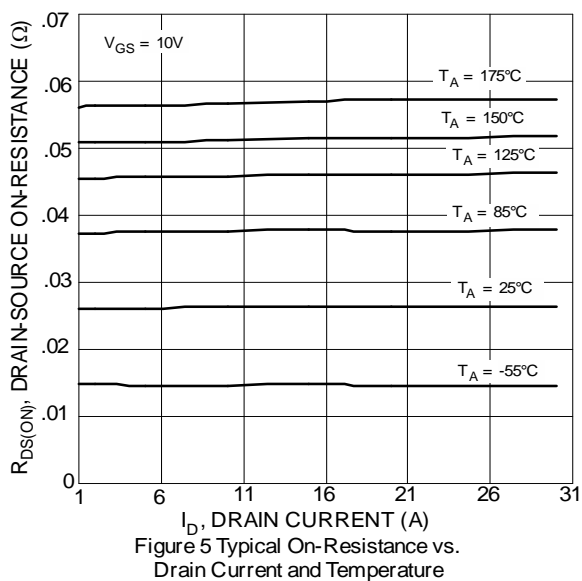
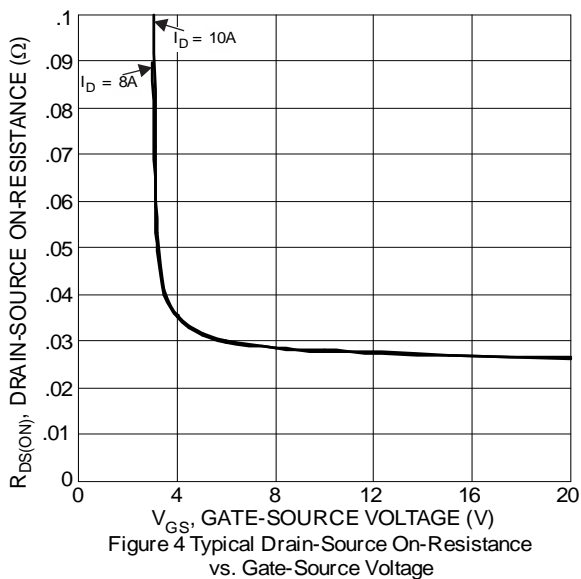
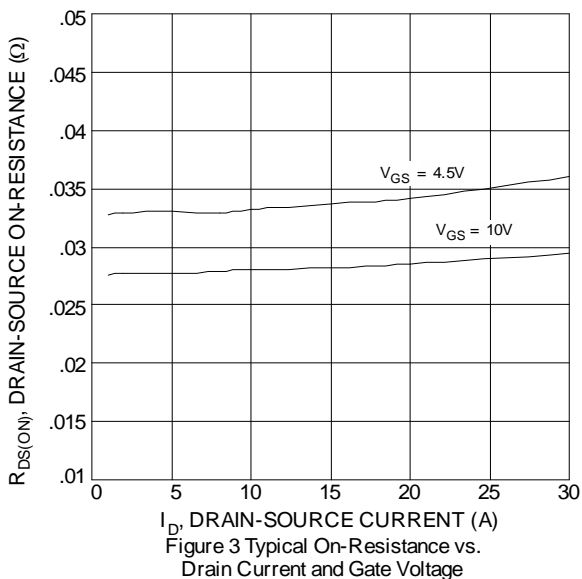
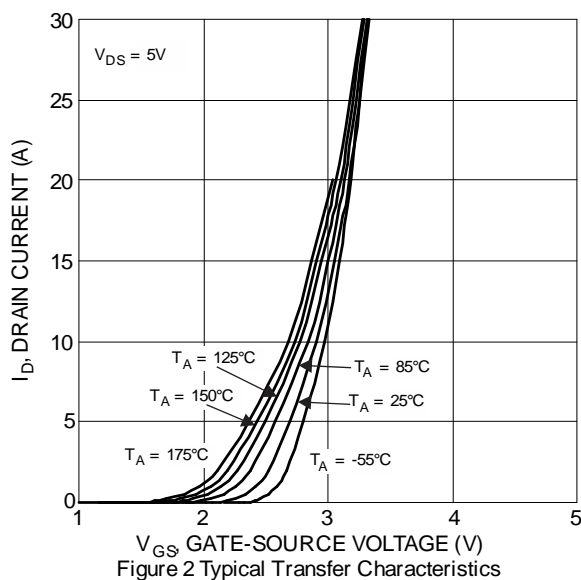
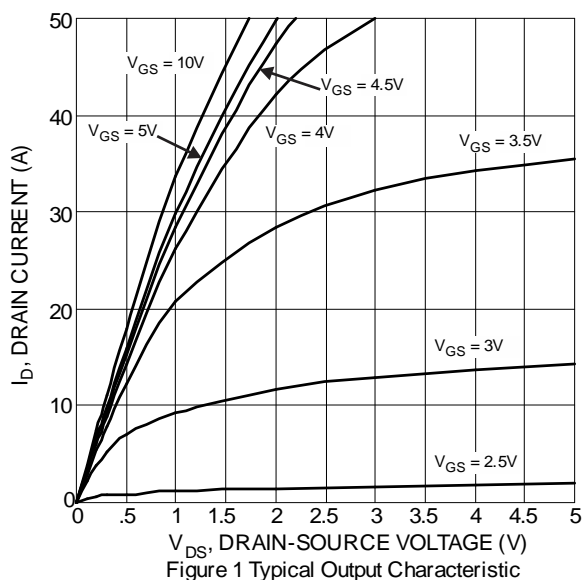
Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_D	2.0	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	80	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)		P_D	3.2	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	41	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case		$R_{\theta JC}$	1.6	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	I_{DSS}	—	—	-1	μA	$V_{DS} = -60\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	—	-3.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	—	33	m Ω	$V_{GS} = -10\text{V}, I_D = -10\text{A}$
		—	—	40		$V_{GS} = -4.5\text{V}, I_D = -8\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	2,569	—	pF	$V_{DS} = -30\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	179	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	143	—	pF	
Gate Resistance	R_g	—	5	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ($V_{GS} = -4.5\text{V}$)	Q_g	—	26.5	—	nC	$V_{DS} = -30\text{V}, I_D = -5\text{A}$
Total Gate Charge ($V_{GS} = -10\text{V}$)	Q_g	—	53.1	—	nC	
Gate-Source Charge	Q_{gs}	—	7.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	12.6	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	6	—	nS	$V_{GS} = -10\text{V}, V_{DS} = -30\text{V},$ $R_G = 3\Omega, I_D = -5\text{A}$
Turn-On Rise Time	t_r	—	7.1	—	nS	
Turn-Off Delay Time	$t_{D(off)}$	—	110	—	nS	
Turn-Off Fall Time	t_f	—	62	—	nS	
Body Diode Reverse Recovery Time	t_{rr}	—	20	—	nS	$I_f = -5\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{rr}	—	14	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout, see <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.
 - I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.



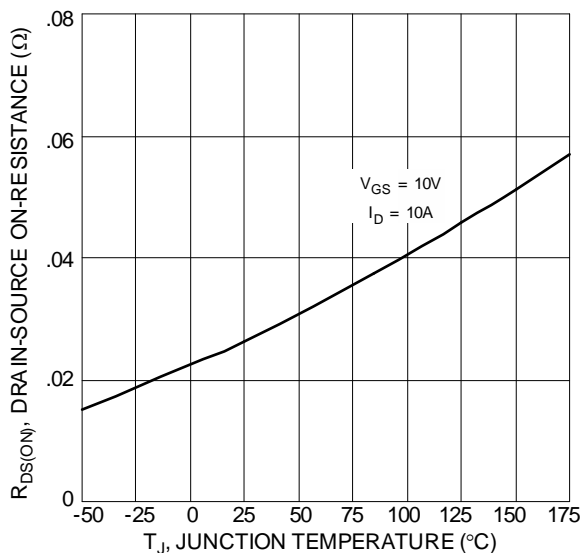


Figure 7 On-Resistance Variation with Temperature

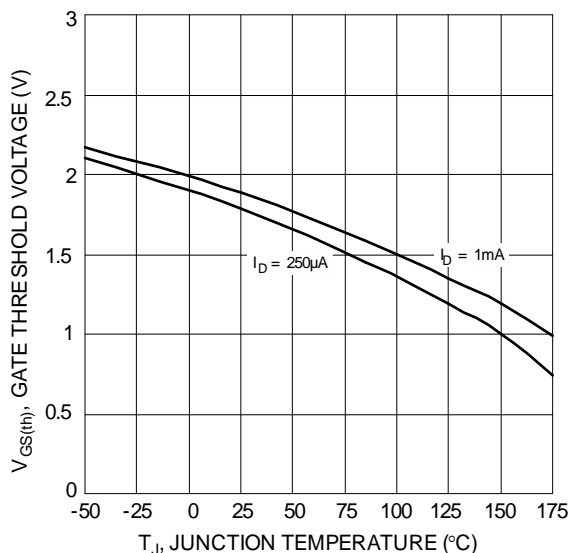


Figure 8 Gate Threshold Variation vs. Ambient Temperature

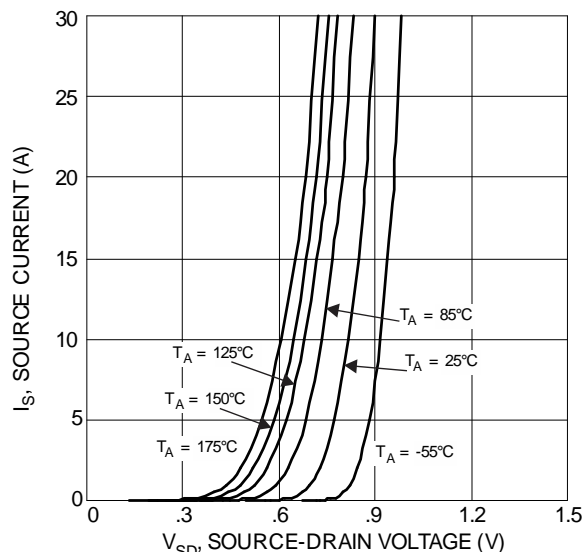


Figure 9 Diode Forward Voltage vs. Current

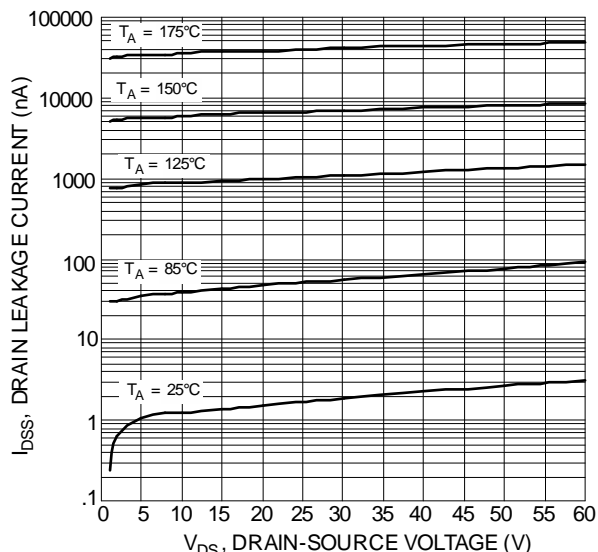


Figure 10 Typical Drain-Source Leakage Current vs. Voltage

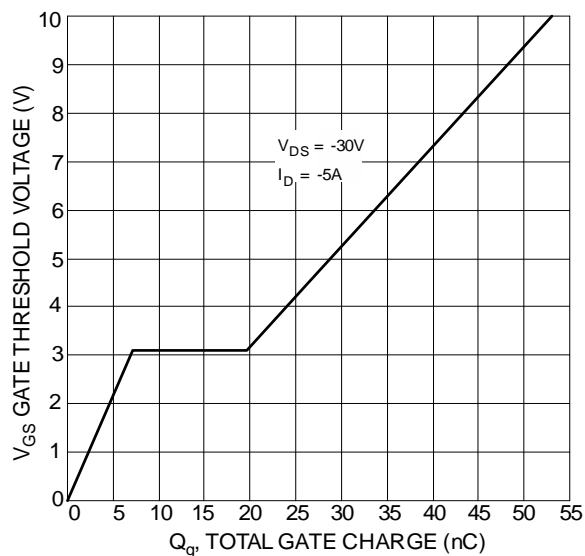


Figure 11 Gate Charge

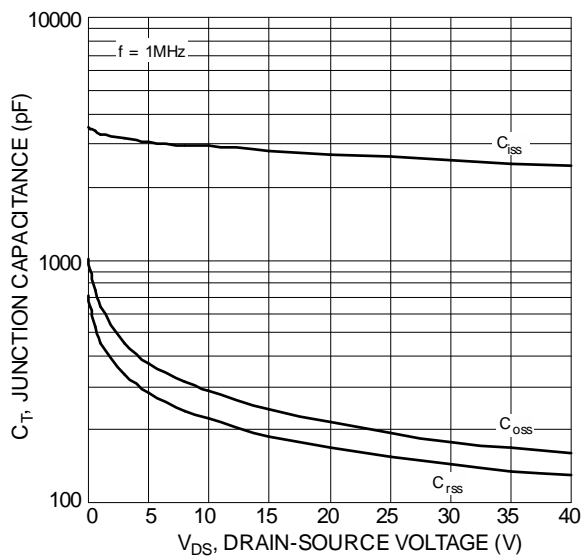
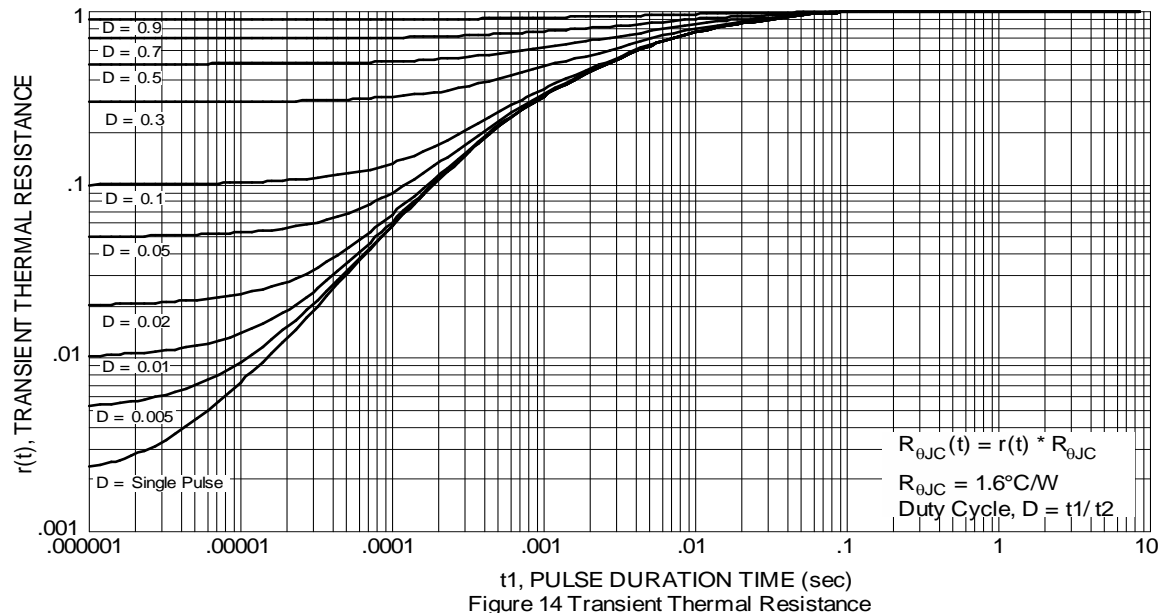
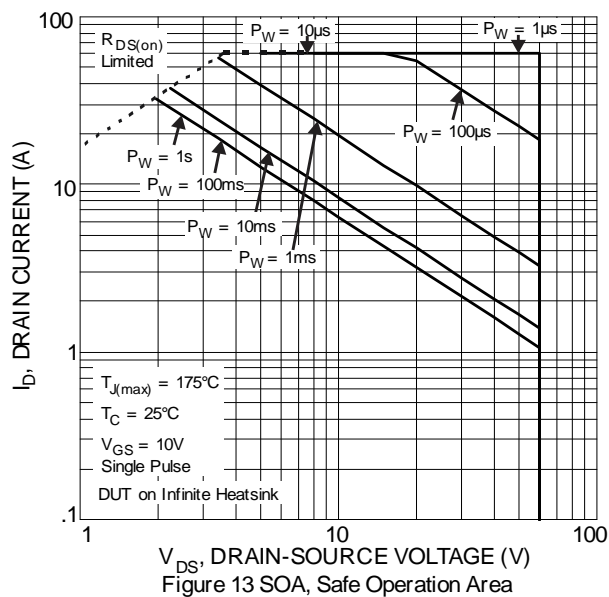
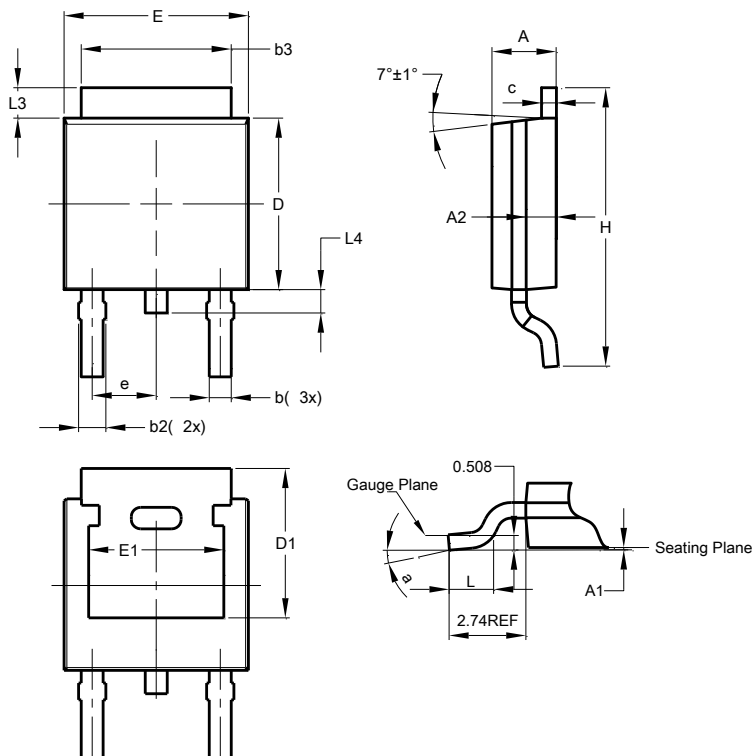


Figure 12 Typical Junction Capacitance



Package Outline Dimensions

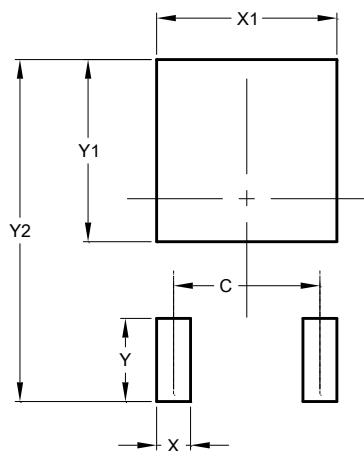
TO252 (DPAK)



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