

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>C</sub> = +25°C (Silicon Limited)	I <sub>D</sub> T <sub>C</sub> = +25°C (Package Limited)
60V	3.4mΩ @ V <sub>GS</sub> = 10V	163A	100A

## Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

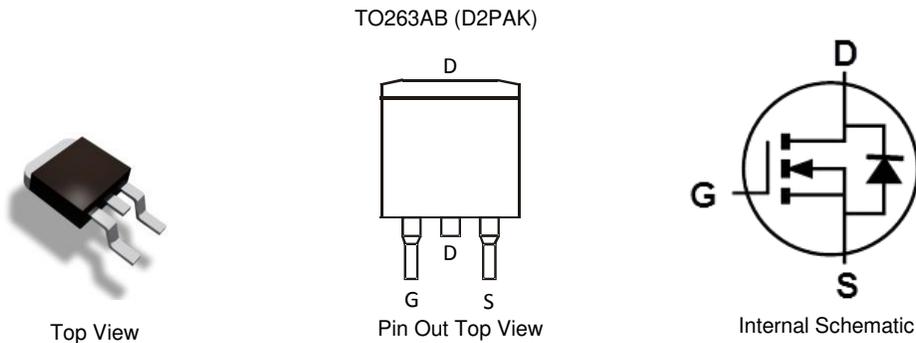
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

## Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low R<sub>DS(ON)</sub> – Minimizes Power Losses
- Low Q<sub>g</sub> – Minimizes Switching Losses
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

- Case: TO263AB (D2PAK)
- 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 Ⓔ3
- Weight: 1.7 grams (Approximate)

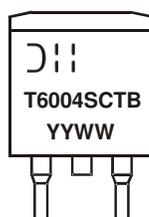


## Ordering Information (Note 5)

Part Number	Case	Packaging
DMTH6004SCTBQ-13	TO263AB (D2PAK)	800 / Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  2. See [http://www.diodes.com/quality/lead\\_free/](http://www.diodes.com/quality/lead_free/) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



⌋⌋⌋ = Manufacturer's Marking  
T6004SCTB = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Last Two Digits of Year (ex: 18 = 2018)  
WW = Week (01 to 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	60	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Silicon Limited, Note 7)	$I_D$	$T_C = +25^\circ\text{C}$	163
		$T_C = +100^\circ\text{C}$	115
Continuous Drain Current (Package Limited, Note 7)	$I_D$	$T_C = +25^\circ\text{C}$	100
		$T_C = +100^\circ\text{C}$	100
Maximum Continuous Body Diode Forward Current (Note 7)	$I_S$	100	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, $T_C = +25^\circ\text{C}$ , Package Limited)	$I_{DM}$	400	A
Pulsed Body Diode Forward Current (10 $\mu\text{s}$ Pulse, $T_C = +25^\circ\text{C}$ , Package Limited)	$I_{SM}$	400	A
Avalanche Current, $L=0.2\text{mH}$	$I_{AS}$	45	A
Avalanche Energy, $L=0.2\text{mH}$	$E_{AS}$	200	mJ

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	$P_D$	4.7	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	32	$^\circ\text{C/W}$
Total Power Dissipation (Note 7)	$P_D$	136	W
Thermal Resistance, Junction to Case (Note 7)	$R_{\theta JC}$	1.1	$^\circ\text{C/W}$
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
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	—	—	V	$V_{GS} = 0\text{V}, I_D = 1\text{mA}$
Zero Gate Voltage Drain Current (Note 9)	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 48\text{V}, V_{GS} = 0\text{V}$
		—	—	100	$\mu\text{A}$	$V_{DS} = 48\text{V}, V_{GS} = 0\text{V}, T_J = 125^\circ\text{C}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	2.9	3.4	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 100\text{A}$
Diode Forward Voltage	$V_{SD}$	—	—	1.3	V	$V_{GS} = 0\text{V}, I_S = 100\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	4,556	—	pF	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	1,383	—		
Reverse Transfer Capacitance	$C_{rss}$	—	105.2	—		
Gate Resistance	$R_g$	0.1	0.66	1.9	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge	$Q_g$	—	95.4	—	nC	$V_{DD} = 30\text{V}, I_D = 90\text{A},$ $V_{GS} = 10\text{V}$
Gate-Source Charge	$Q_{gs}$	—	21.6	—		
Gate-Drain Charge	$Q_{gd}$	—	20.4	—		
Turn-On Delay Time	$t_{D(ON)}$	—	13.2	—	ns	$V_{DD} = 30\text{V}, V_{GS} = 10\text{V},$ $I_D = 90\text{A}, R_g = 3.5\Omega$
Turn-On Rise Time	$t_R$	—	11.7	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	31	—		
Turn-Off Fall Time	$t_F$	—	12	—		
Reverse Recovery Time	$t_{RR}$	—	50.5	—	ns	$I_F = 50\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	$Q_{RR}$	—	80.8	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  - Thermal resistance from junction to soldering point (on the exposed drain pad).
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

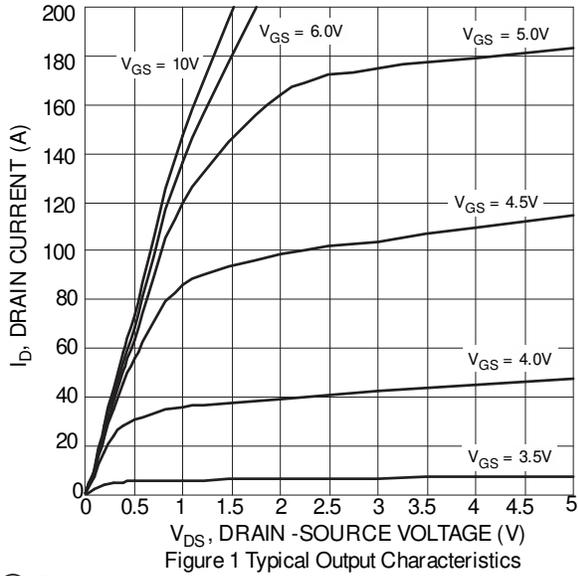


Figure 1 Typical Output Characteristics

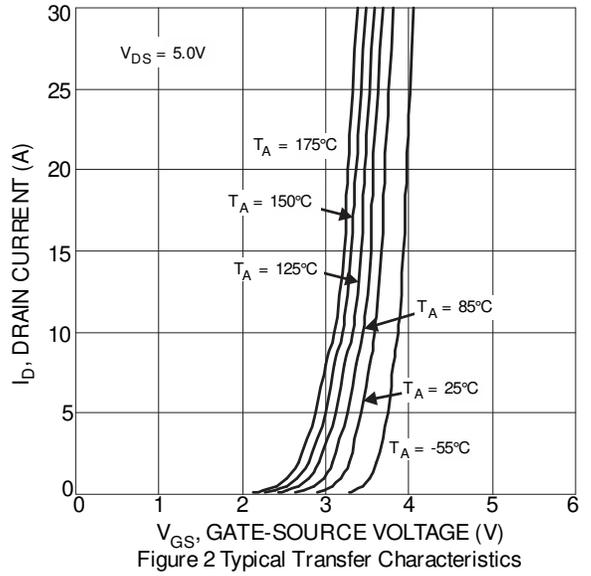


Figure 2 Typical Transfer Characteristics

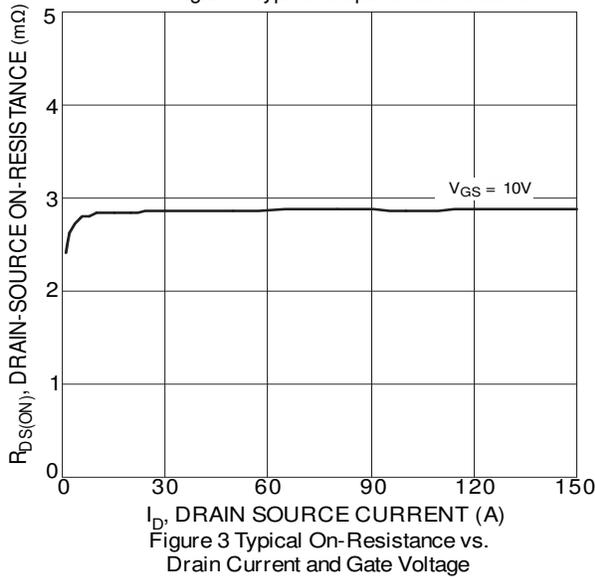


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

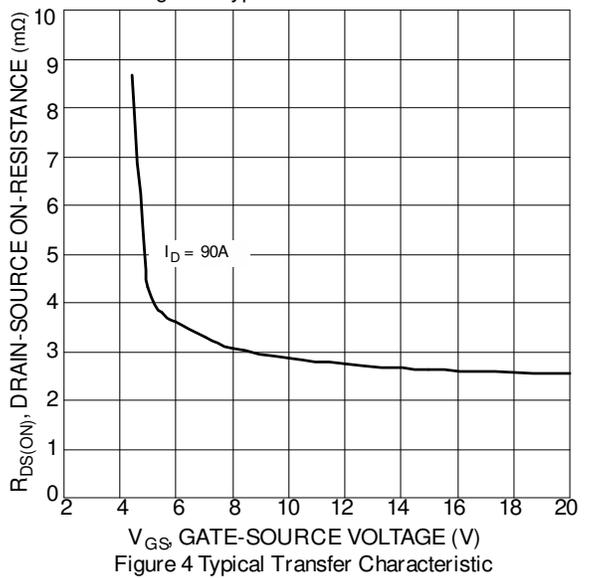


Figure 4 Typical Transfer Characteristic

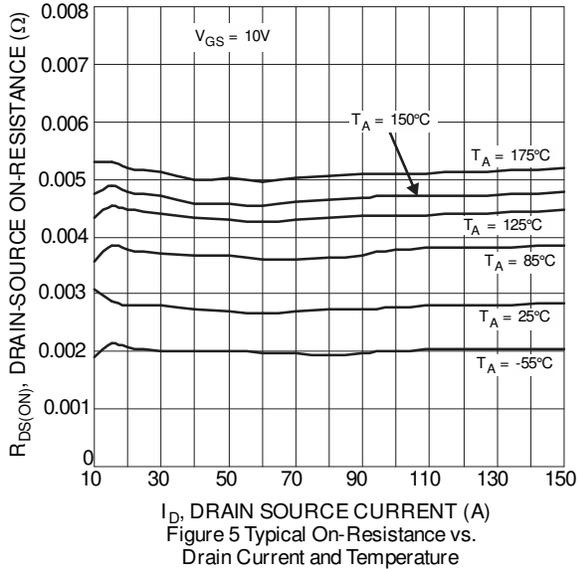


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

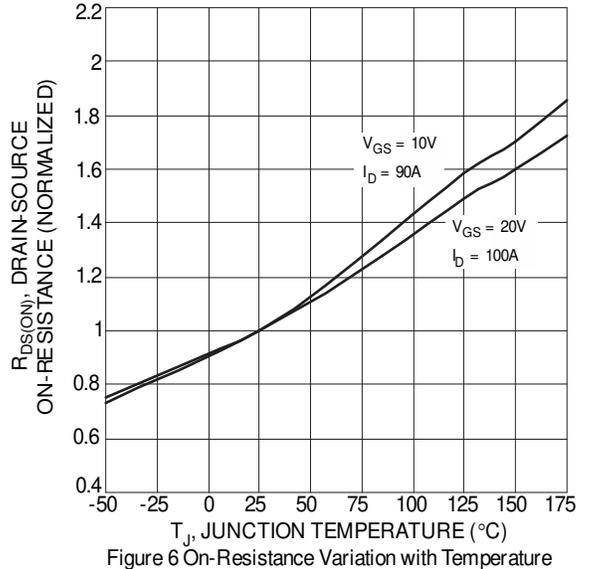


Figure 6 On-Resistance Variation with Temperature

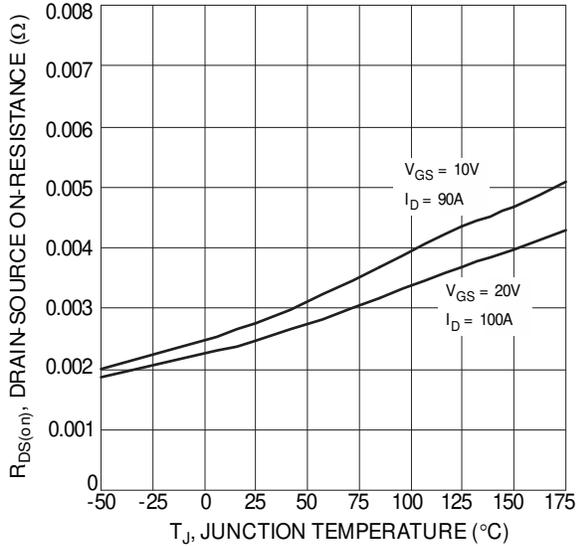


Figure 7 On-Resistance Variation with Temperature

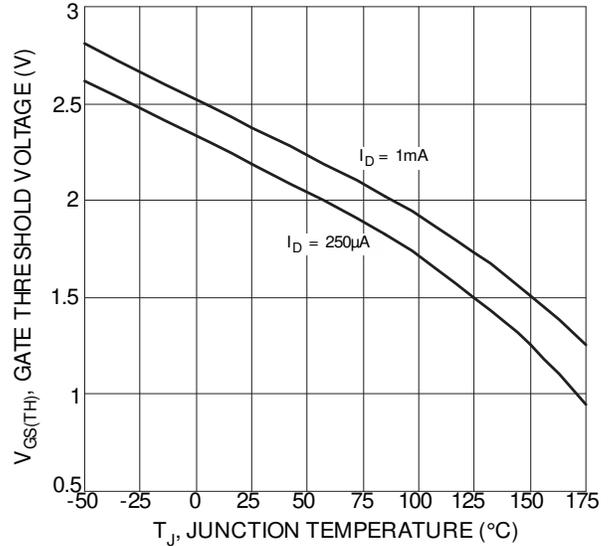


Figure 8 Gate Threshold Variation vs. Temperature

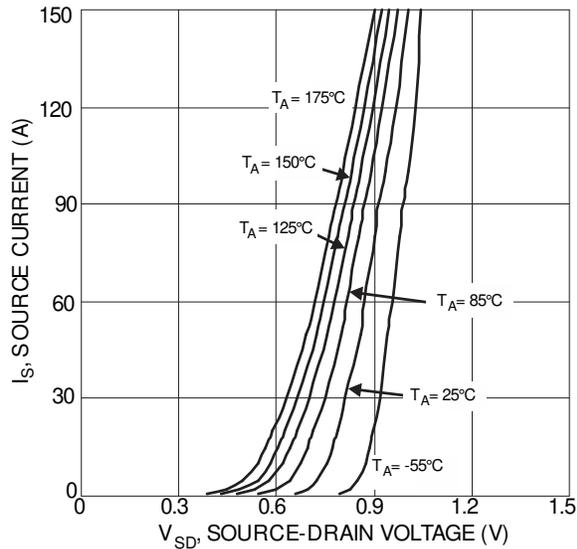


Figure 9 Diode Forward Voltage vs. Current

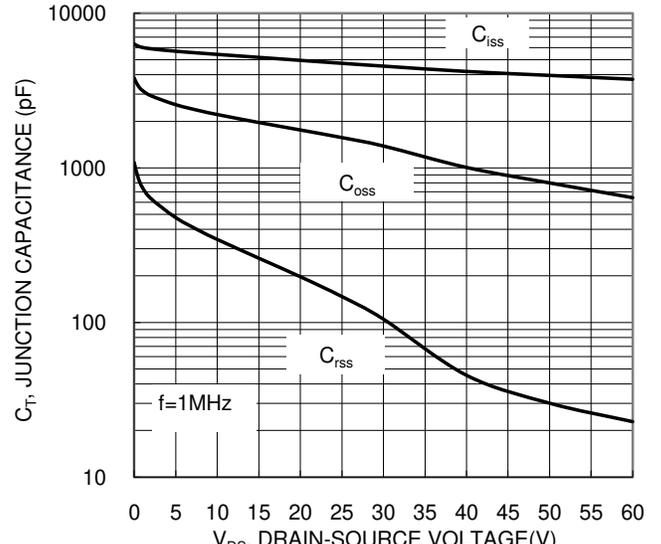


Figure 10. Typical Junction Capacitance

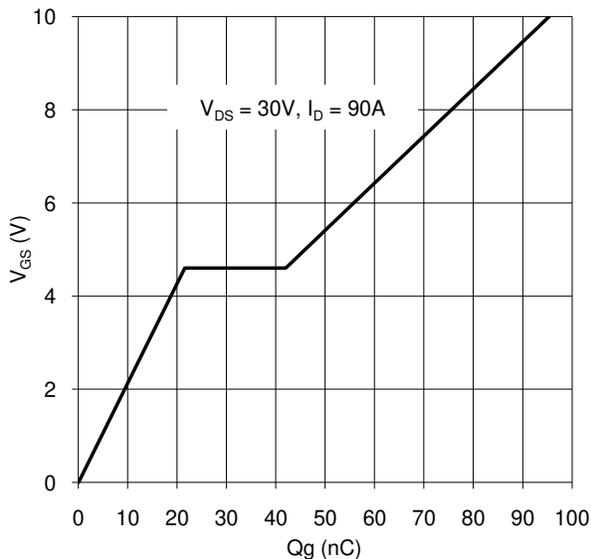


Figure 11. Gate Charge

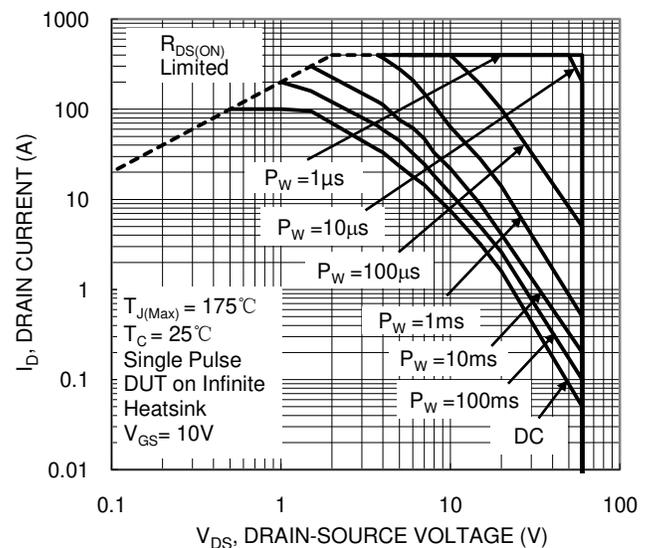
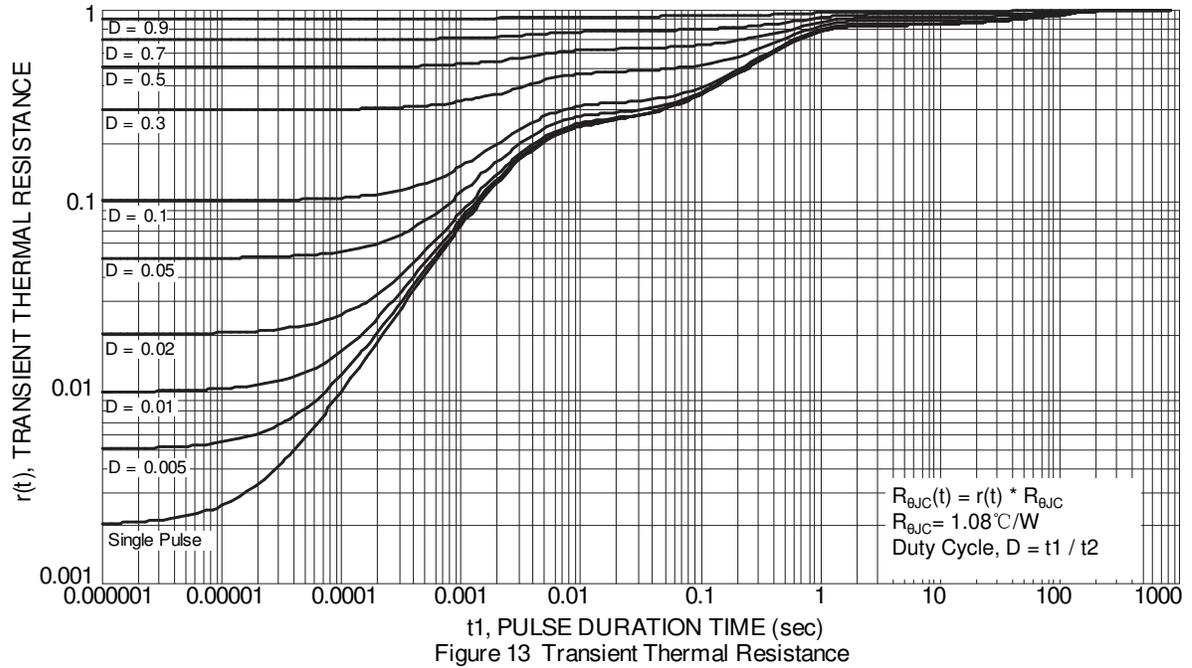


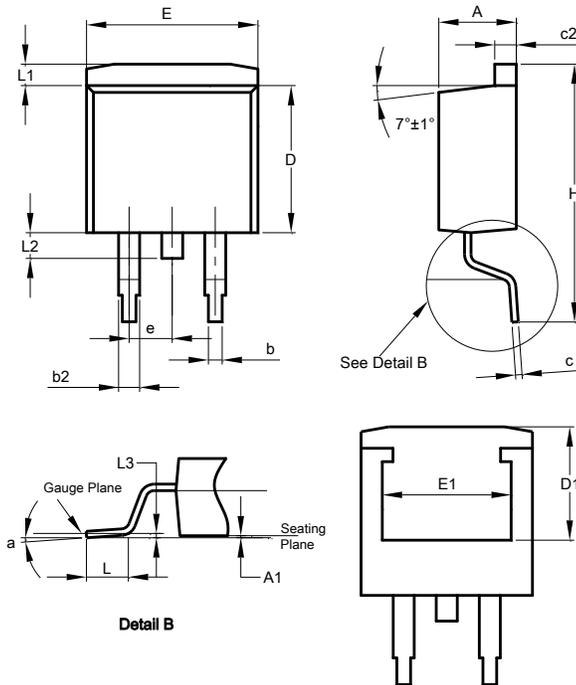
Figure 12. SOA, Safe Operation Area



## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

TO263AB (D2PAK)

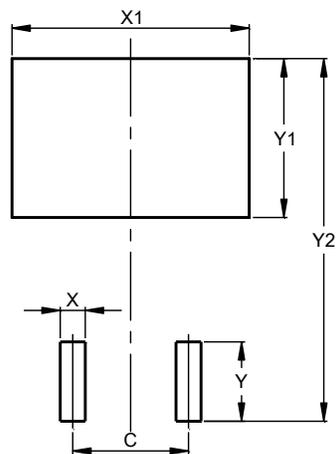


TO263AB (D2PAK)			
Dim	Min	Max	Typ
A	4.07	4.82	-
A1	0.00	0.25	-
b	0.51	0.99	-
b2	1.15	1.77	-
c	0.356	0.73	-
c2	1.143	1.65	-
D	8.39	9.65	-
D1	6.55	6.95	-
e	2.54 TYP		
E	9.66	10.66	-
E1	6.23	8.23	-
H	14.61	15.87	-
L	1.78	2.79	-
L1	-	1.67	-
L2	-	1.77	-
L3	-	-	0.254
a	0°	8°	-
All Dimensions in mm			

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

TO263AB (D2PAK)



Dimensions	Value (in mm)
C	5.08
X	1.10
X1	10.41
Y	3.50
Y1	7.01
Y2	15.99

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