

## 30V N-Ch Power MOSFET

### Feature

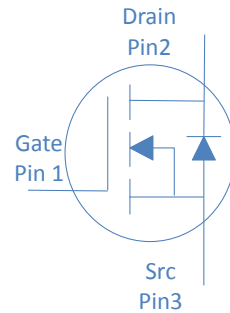
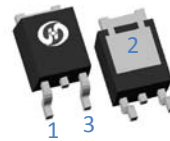
- ◇ Optimized for high speed switching
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free, Halogen Free

$V_{DS}$		30	V
$R_{DS(on),typ}$	$V_{GS}=10V$	5.4	mΩ
$R_{DS(on),typ}$	$V_{GS}=4.5V$	7.2	mΩ
$I_D$ (Silicon Limited)		76.1	A
$I_D$ (Package Limited)		46	A

### Application

- ◇ Hard Switching and High Speed Circuit
- ◇ DC/DC in Telecoms and Industrial

TO-252



Part Number	Package	Marking
HTD058N03R	TO-252	TD058N03R

### Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current (Silicon Limited)	$I_D$	$T_C=25^\circ\text{C}$	76	A
		$T_C=100^\circ\text{C}$	54	
		Continuous Drain Current (Package Limited)	$T_C=25^\circ\text{C}$	
Drain to Source Voltage	$V_{DS}$	-	30	V
Gate to Source Voltage	$V_{GS}$	-	$\pm 20$	V
Pulsed Drain Current	$I_{DM}$	-	180	A
Avalanche Energy, Single Pulse	$E_{AS}$	$L=0.1\text{mH}, T_C=25^\circ\text{C}$	88	mJ
Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	65	W
Operating and Storage Temperature	$T_J, T_{stg}$	-	-55 to 175	$^\circ\text{C}$

### Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Case	$R_{\theta JC}$	2.3	$^\circ\text{C/W}$
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	62	$^\circ\text{C/W}$

**Electrical Characteristics at  $T_j=25^\circ\text{C}$  (unless otherwise specified)**
**Static Characteristics**

Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1	1.6	2.5	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS}=0V, V_{DS}=30V, T_j=25^\circ\text{C}$	-	-	1	$\mu A$
		$V_{GS}=0V, V_{DS}=24V, T_j=100^\circ\text{C}$	-	-	10	
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Drain to Source on Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	5.4	5.8	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	-	7.2	9.0	
Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=10A$	-	18	-	S
Gate Resistance	$R_G$	$V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$	-	2.5	-	$\Omega$

**Dynamic Characteristics**

Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$	-	1239	-	pF
Output Capacitance	$C_{oss}$		-	152	-	
Reverse Transfer Capacitance	$C_{rss}$		-	110	-	
Total Gate Charge	$Q_g(10V)$	$V_{DD}=15V, I_D=20A, V_{GS}=4.5V$	-	24	-	nC
Total Gate Charge	$Q_g(4.5V)$		-	12	-	
Gate to Source Charge	$Q_{gs}$		-	4	-	
Gate to Drain (Miller) Charge	$Q_{gd}$		-	5	-	
Turn on Delay Time	$t_{d(on)}$	$V_{DD}=15V, I_D=15A, V_{GS}=10V, R_G=3.3\Omega,$	-	7.0	-	ns
Rise time	$t_r$		-	14.0	-	
Turn off Delay Time	$t_{d(off)}$		-	20	-	
Fall Time	$t_f$		-	2	-	

**Reverse Diode Characteristics**

Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_F=1A$	-	-	1	V
Reverse Recovery Time	$t_{rr}$	$V_R=15V, I_F=20A, dI_F/dt=100A/\mu s$	-	20	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	10	-	nC

Fig 1. Typical Output Characteristics

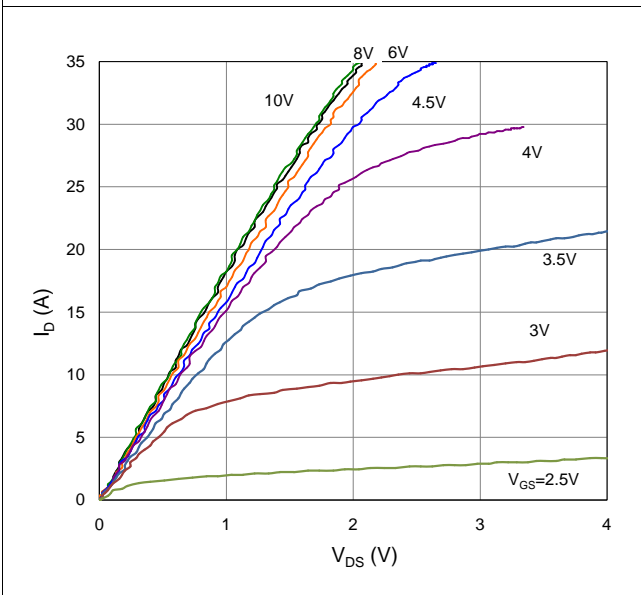


Figure 2. On-Resistance vs. Gate-Source Voltage

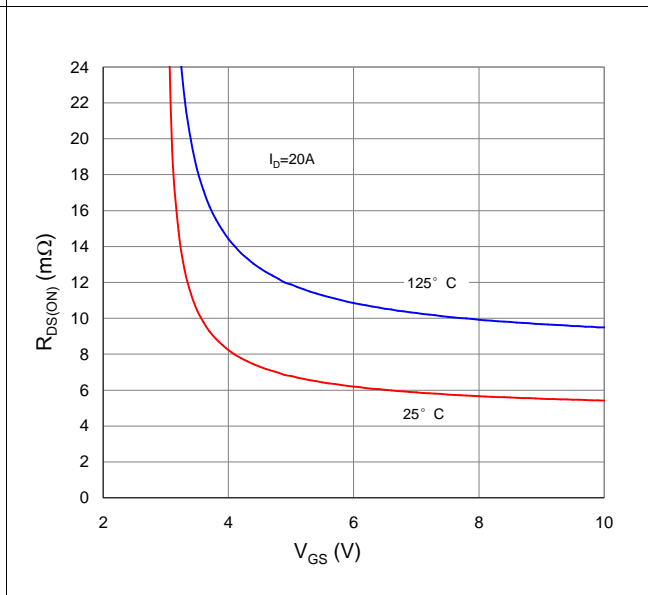


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

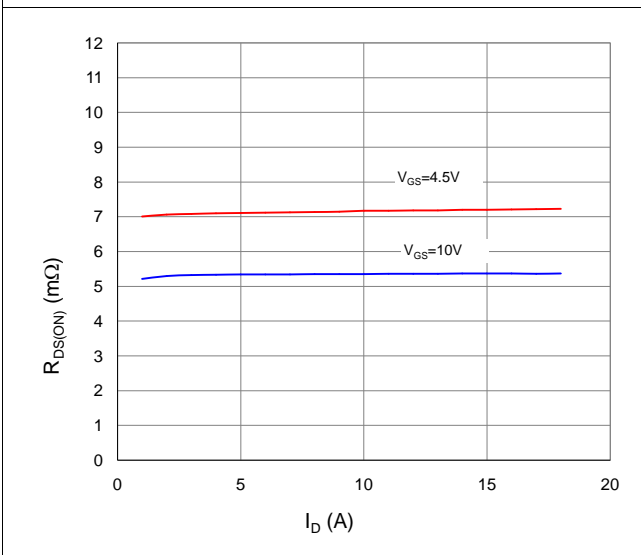


Figure 4. Normalized On-Resistance vs. Junction Temperature

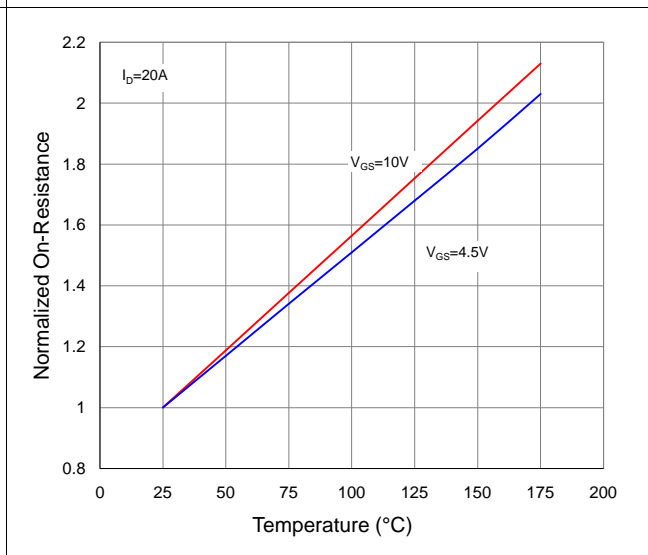


Figure 5. Typical Transfer Characteristics

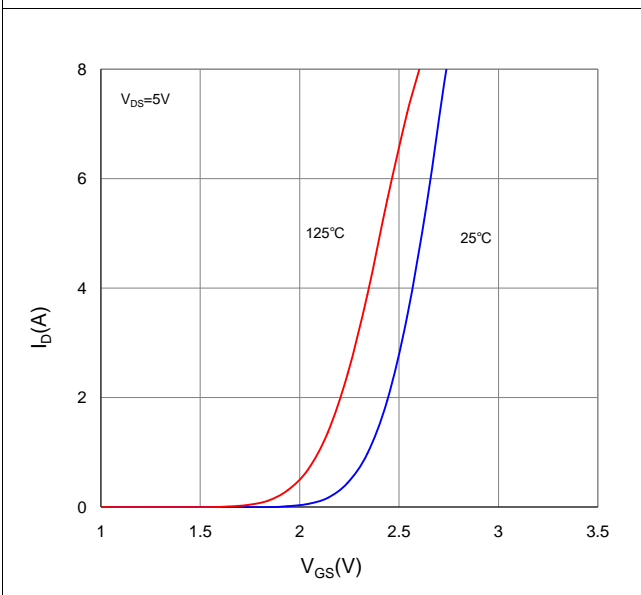


Figure 6. Typical Source-Drain Diode Forward Voltage

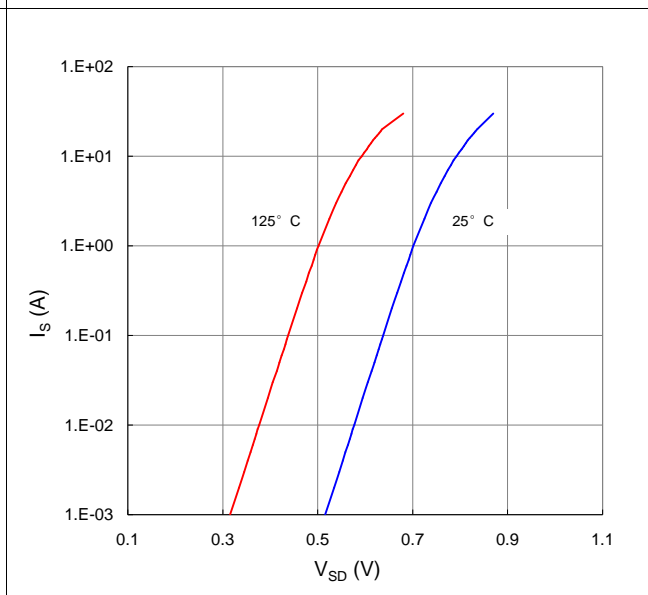


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

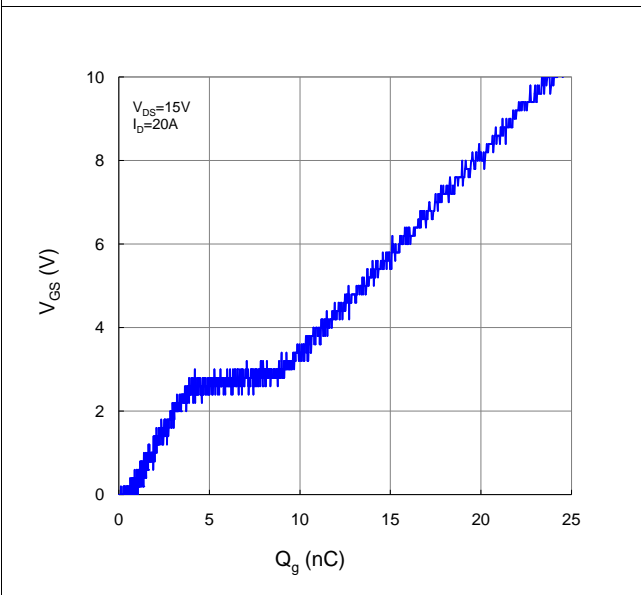


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

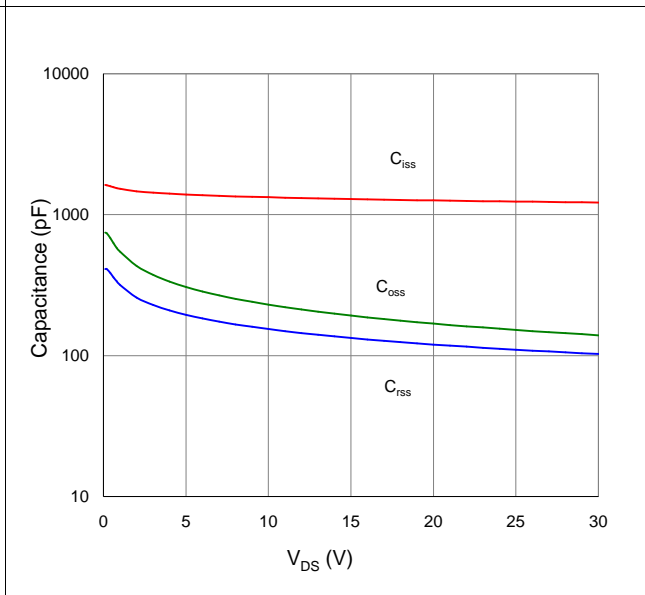


Figure 9. Maximum Safe Operating Area

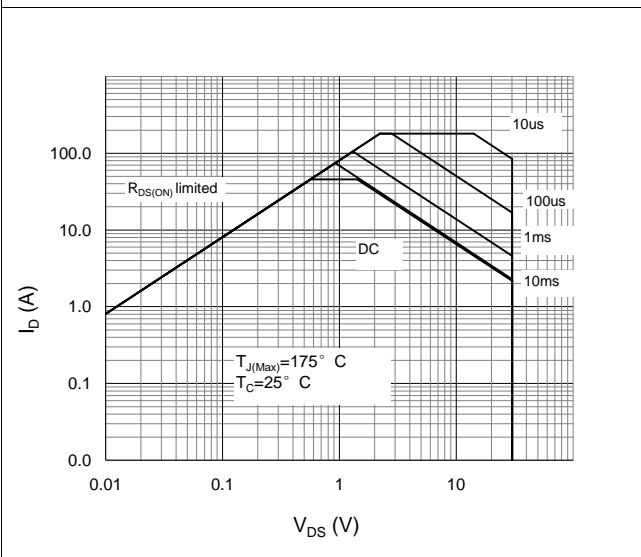


Figure 10. Maximum Drain Current vs. Case Temperature

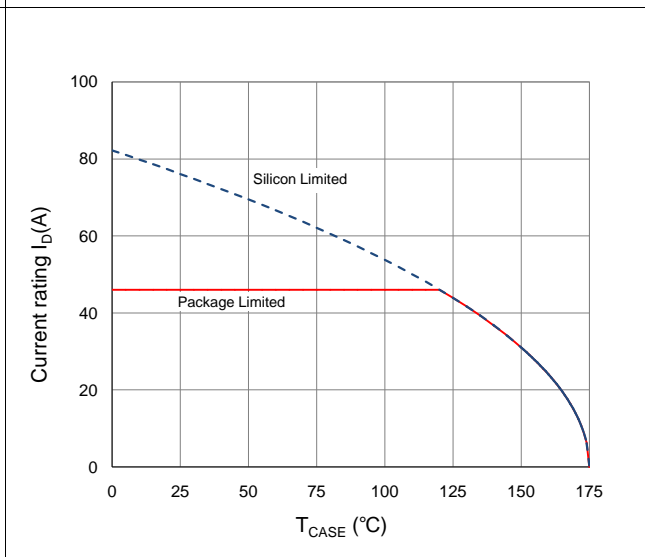
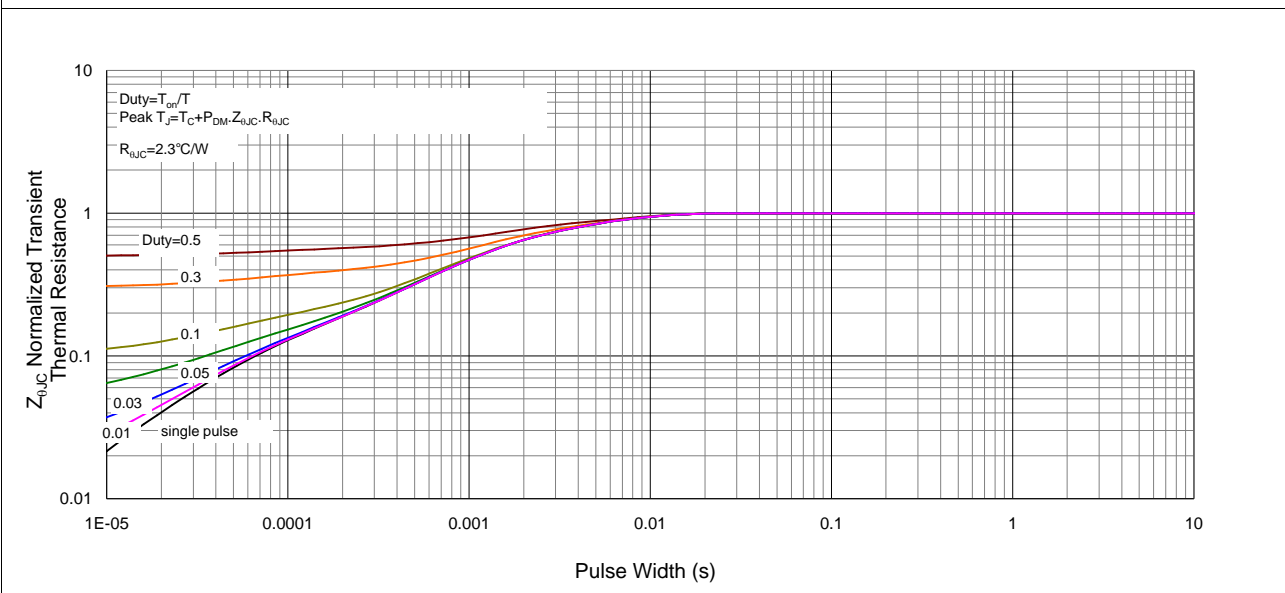
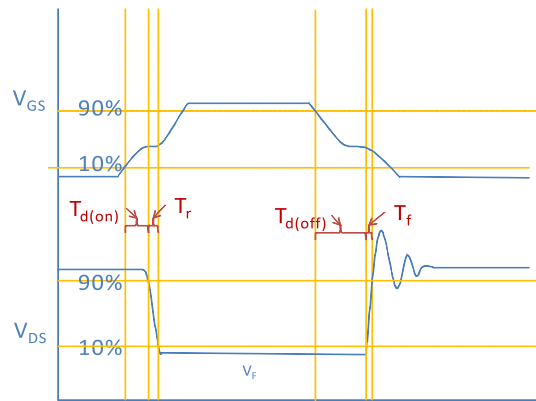


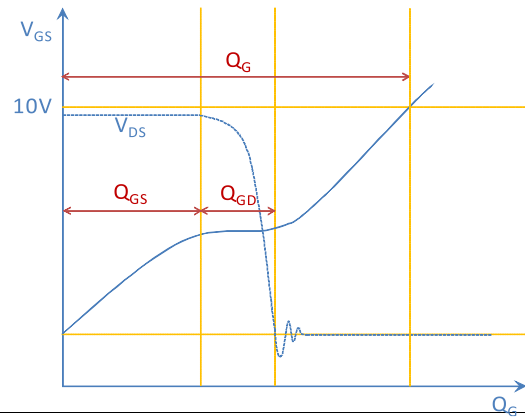
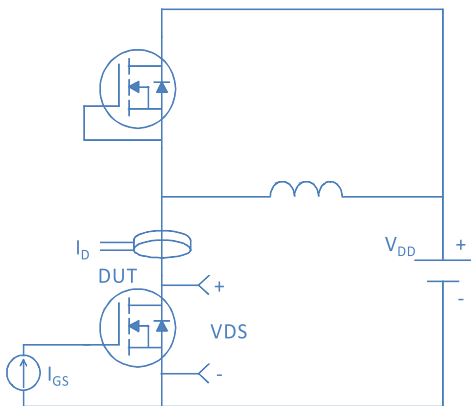
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



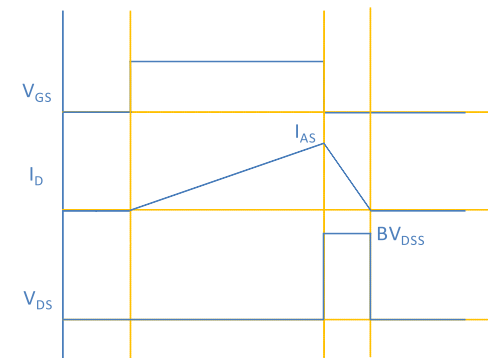
Inductive switching Test



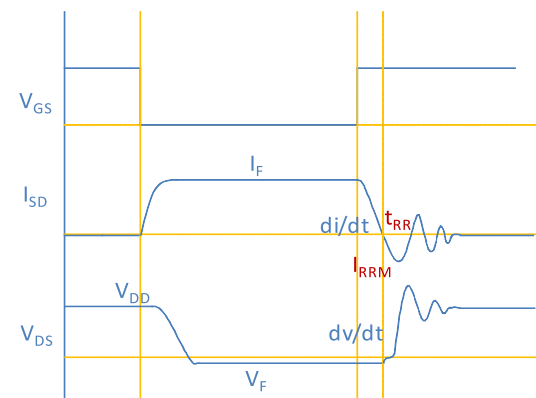
Gate Charge Test



Uclamped Inductive Switching (UIS) Test

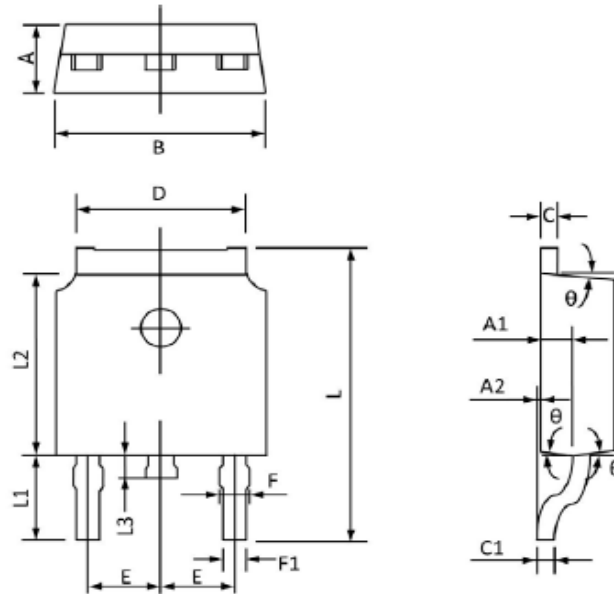


Diode Recovery Test



Package Outline

TO-252 2 leads



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.50	6.70	0.256	0.264
C	0.46	0.580	0.018	0.230
C1	0.46	0.580	0.018	0.030
D	5.10	5.46	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.74	0.94	0.029	0.037
F1	0.660	0.860	0.026	0.034
L	9.80	10.40	0.386	0.409
L1	2.9REF		0.114REF	
L2	6.00	6.20	0.236	0.244
L3	0.60	1.00	0.024	0.039
$\theta$	3°	9°	3°	9°