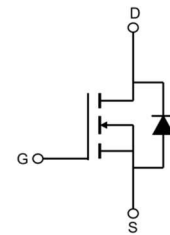


Feature

- 60V,40A
 $R_{DS(ON)} < 18m\Omega @ V_{GS}=10V$ TYP:14.5 m Ω
 $R_{DS(ON)} < 22m\Omega @ V_{GS}=4.5V$ TYP:18 m Ω
- Advanced Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge



Schematic Diagram



Marking and pin assignment

Application

- PWM applications
- Load Switch
- Power management

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
40N06K	AP40N06K	TO-252	13 inch	-	2500

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_a=25^\circ\text{C}$)	I_D	40	A
Continuous Drain Current ($T_a=100^\circ\text{C}$)	I_D	28	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	160	A
Singel Pulsed Avalanche Energy ⁽²⁾	E_{AS}	45	mJ
Power Dissipation	P_D	65	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2.1	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

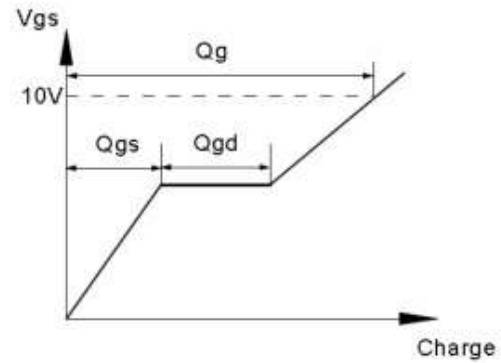
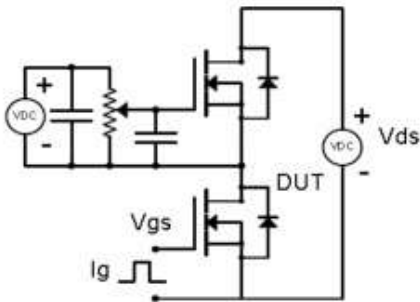
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	60	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$	-	-	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage ⁽³⁾	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.5	2.5	V
Drain-source on-resistance ⁽³⁾	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 15A$	-	14.5	18	m Ω
		$V_{GS} = 4.5V, I_D = 10A$	-	18	22	
Forward tranconductance ⁽³⁾	g_{FS}	$V_{DS} = 10V, I_D = 15A$	-	15	-	S
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 30V, V_{GS} = 0V, f = 1MHz$	-	1115	-	pF
Output Capacitance	C_{oss}		-	91	-	
Reverse Transfer Capacitance	C_{rss}		-	82	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 30V, I_D = 10A$ $V_{GS} = 10V, R_G = 1.8\Omega$	-	5.9	-	ns
Turn-on rise time	t_r		-	9.1	-	
Turn-off delay time	$t_{d(off)}$		-	35	-	
Turn-off fall time	t_f		-	12	-	
Total Gate Charge	Q_g	$V_{DS} = 30V, I_D = 10A,$ $V_{GS} = 10V$	-	27	-	nC
Gate-Source Charge	Q_{gs}		-	2.9	-	
Gate-Drain Charge	Q_{gd}		-	7.6	-	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V_{DS}	$V_{GS} = 0V, I_S = 15A$	-	-	1.2	V
Diode Forward current ⁽⁴⁾	I_S		-	-	40	A
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}, I_F = 10A, di/dt = 100A/us$		27		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$T_J = 25^{\circ}, I_F = 10A, di/dt = 100A/us$		23		nc

Notes:

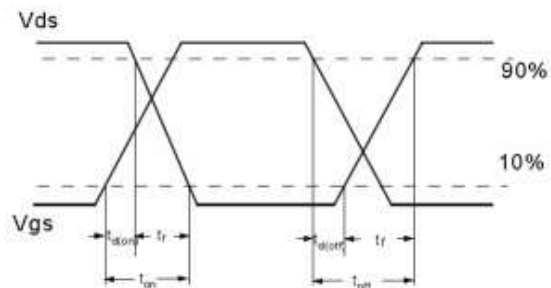
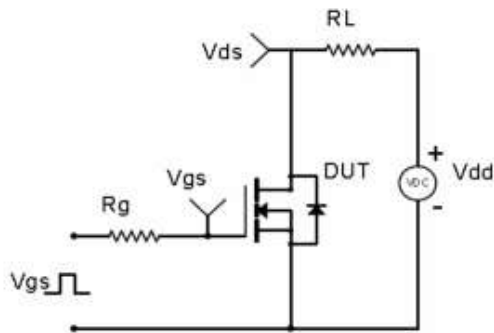
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^{\circ}\text{C}, V_{DD} = 30V, R_G = 25\Omega, L = 0.5mH$
3. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10$ sec

Test Circuit & Waveform

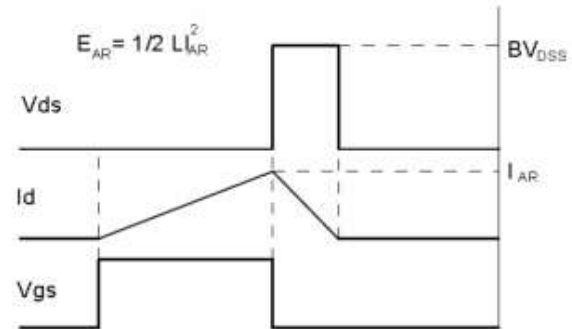
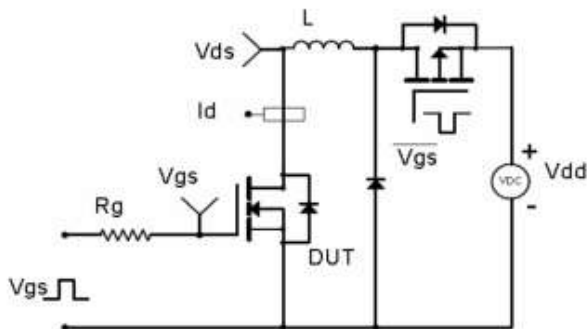
Gate Charge Test Circuit & Waveform



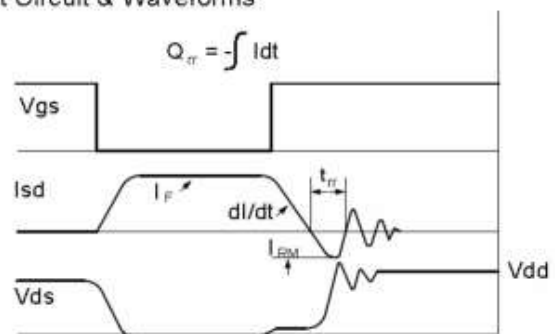
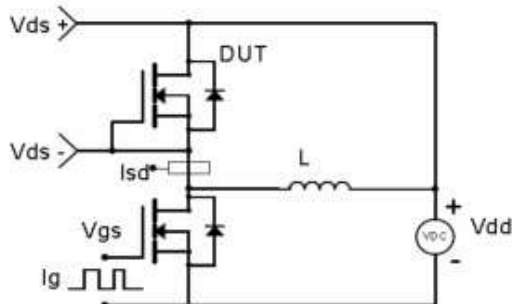
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Characteristics (@ $T_J = 25^\circ\text{C}$, unless otherwise specified.)

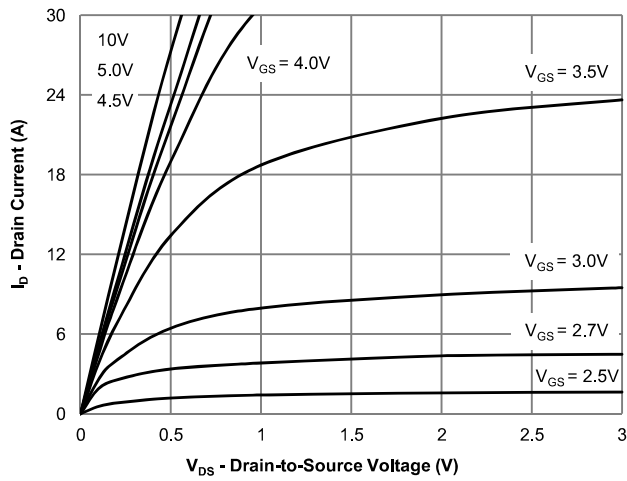


Figure 1: Output Characteristics

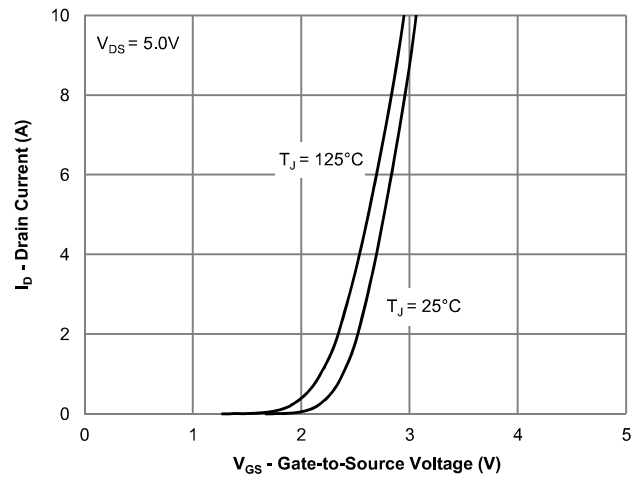


Figure 2: Transfer Characteristics

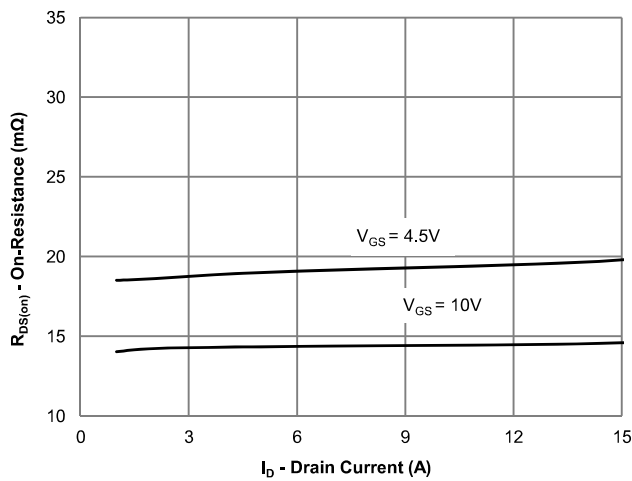


Figure 3: On-Resistance vs. Gate-Source Voltage

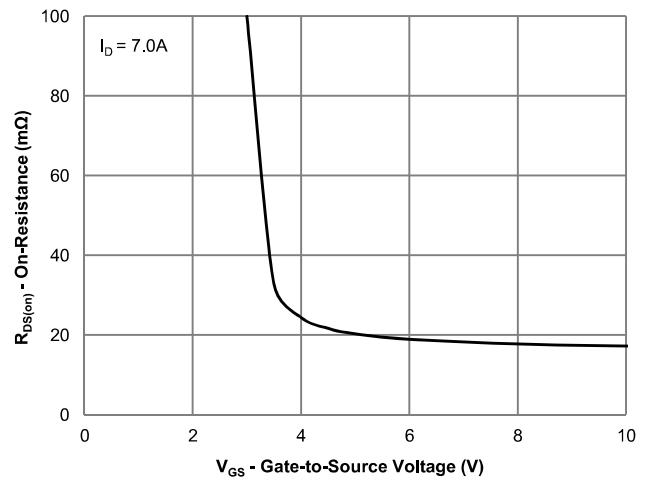


Figure 4: On-Resistance vs. Gate-Source Voltage

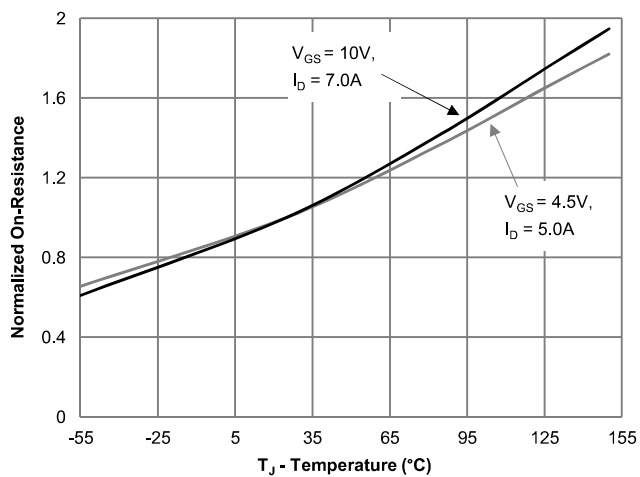


Figure 5: On-Resistance vs. Junction Temperature

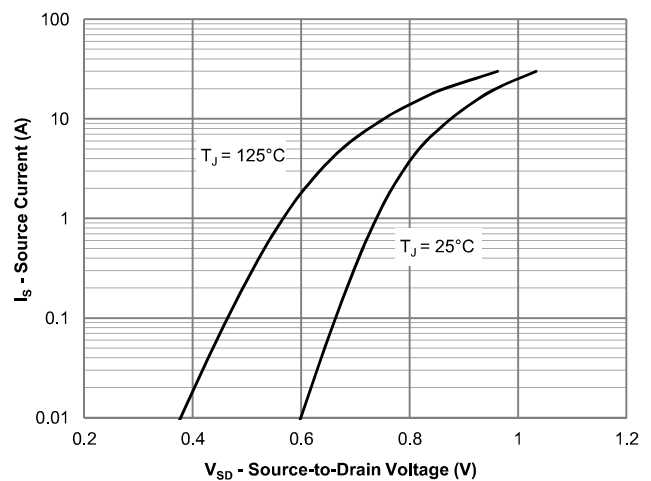


Figure 6: Source-Drain Diode Forward Voltage

Typical Characteristics (@ $T_J = 25^\circ\text{C}$, unless otherwise specified.)

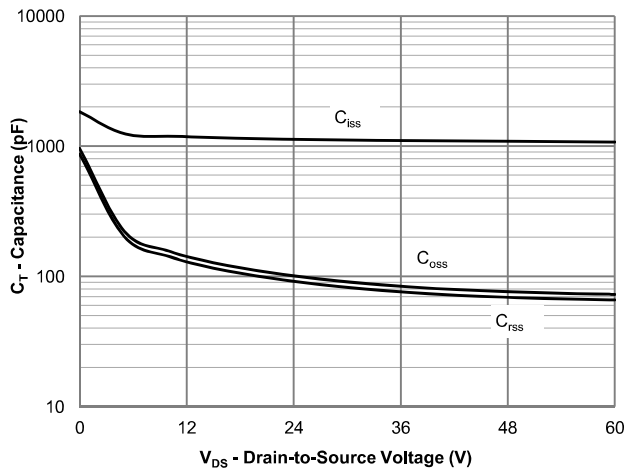


Figure 7: Capacitance Characteristics

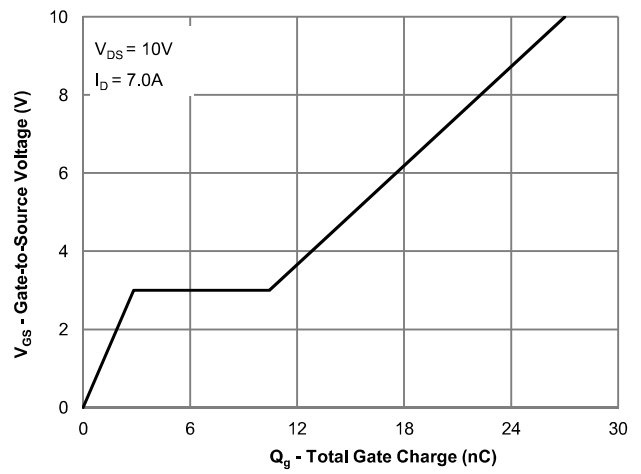


Figure 8: Gate Charge Characteristics

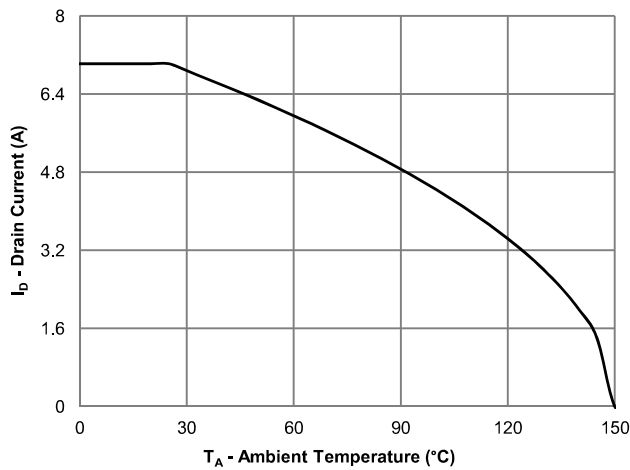


Figure 9: Current Derating

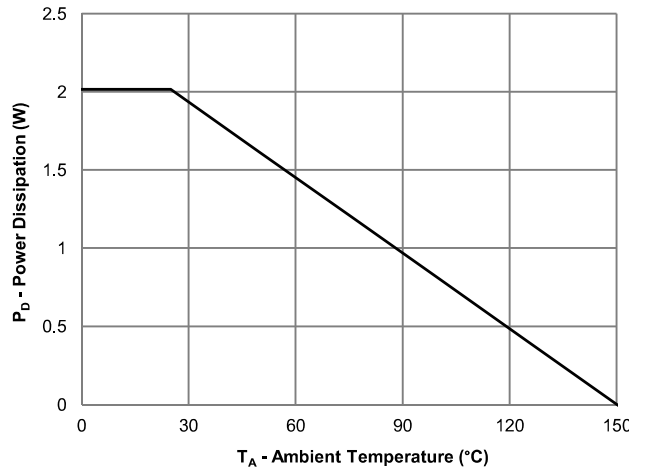


Figure 10: Power Derating

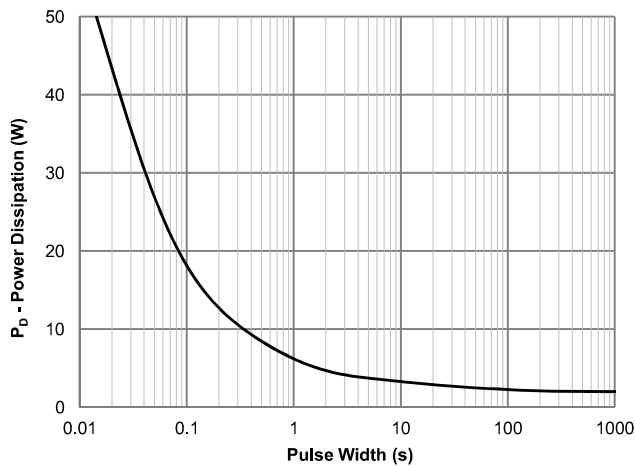


Figure 11: Single Pulse Power, Junction-to-Ambient

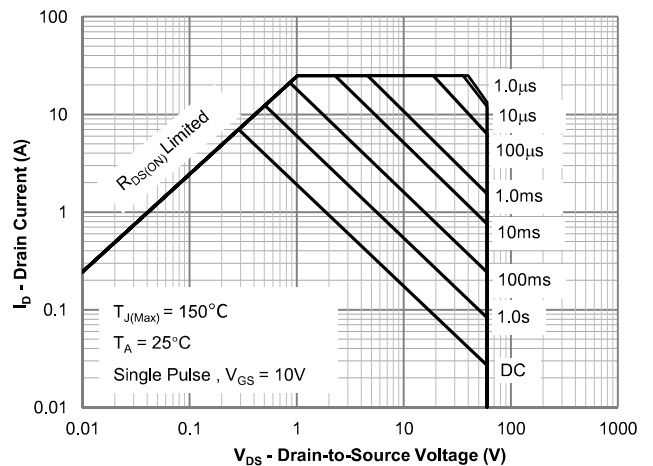


Figure 12: Safe Operating Area

Typical Characteristics (@ $T_J = 25^\circ\text{C}$, unless otherwise specified.)

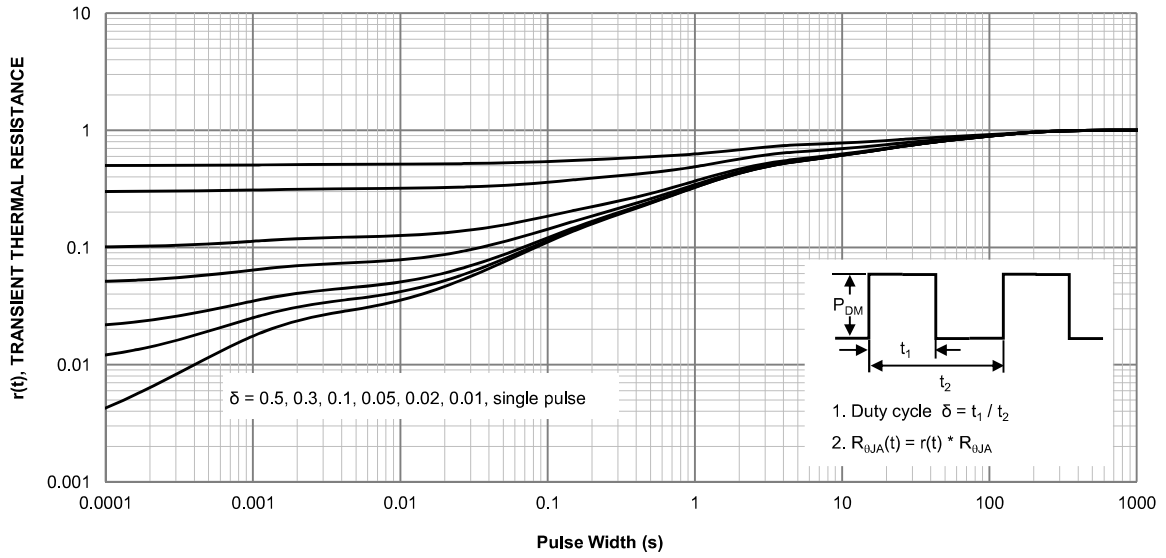
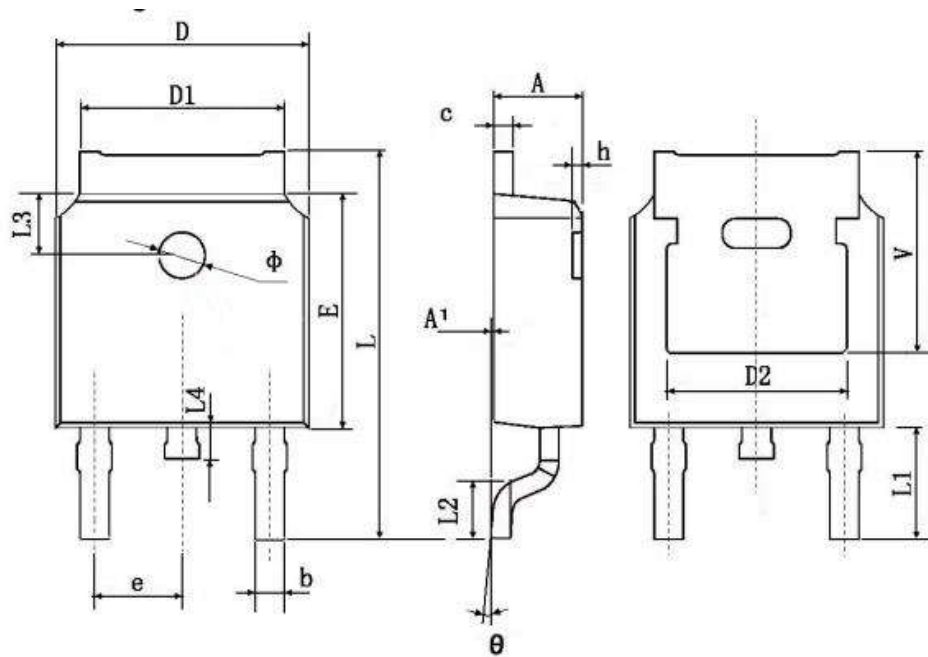


Figure 13: Normalized Thermal Transient Impedance

TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.350	0.089	0.093
A1	0.050	0.150	0.002	0.006
b	0.660	0.860	0.026	0.034
c	0.458	0.558	0.018	0.022
D	6.550	6.650	0.259	0.263
D1	5.234	5.434	0.207	0.215
D2	4.826 TYP.		0.191 TYP.	
E	6.050	6.150	0.239	0.243
e	2.236	2.336	0.088	0.092
L	9.820	10.220	0.388	0.404
L1	3.000 TYP.		0.119 TYP.	
L2	1.400	1.600	0.055	0.063
L3	1.800 TYP.		0.071 TYP.	
L4	0.700	0.900	0.028	0.036
Φ	1.150	1.250	0.045	0.049
θ	0°	3°	0°	3°
h	0.000	0.300	0.000	0.012
V	5.399 TYP		0.213 TYP	