

## N-Channel Trench Power MOSFET

### General Description

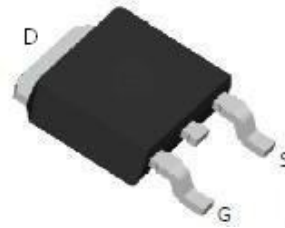
The HD80N06 combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . Those devices are suitable for use in PWM, load switching and general purpose applications.

### Features

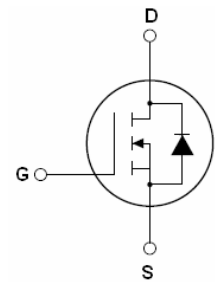
- $V_{DS}=60V$ ;  $I_D=80A$   
 $R_{DS(ON)} < 11m\Omega @ V_{GS}=10V$
- Ultra Low On-Resistance
- High UIS and UIS 100% Test

### Application

- Power switching application
- load switching



To-252 Top View



Schematic Diagram

$$V_{DS} = 60V$$

$$I_D = 80A$$

$$R_{DS(ON)} = 9m\Omega$$

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HD80N06	HD80N06	TO-252	-	-	-

Table 1. Absolute Maximum Ratings (TA=25°C)

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage ( $V_{GS}=0V$ )	60	V
$V_{GS}$	Gate-Source Voltage ( $V_{DS}=0V$ )	$\pm 25$	V
$I_{D(DC)}$	Drain Current (DC) at $T_c=25^\circ C$	80	A
$I_{D(DC)}$	Drain Current (DC) at $T_c=100^\circ C$	56	A
$I_{DM (pulse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	280	A
$P_D$	Maximum Power Dissipation( $T_c=25^\circ C$ )	160	W
$E_{AS}$	Single Pulse Avalanche Energy (Note 2)	480	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 175	$^\circ C$

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.EAS condition: $T_J=25^\circ C, V_{DD}=30V, V_G=10V, R_G=25\Omega$

**Table 2. Thermal Characteristic**

Symbol	Parameter	Value	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	---	0.85	$^{\circ}C/W$

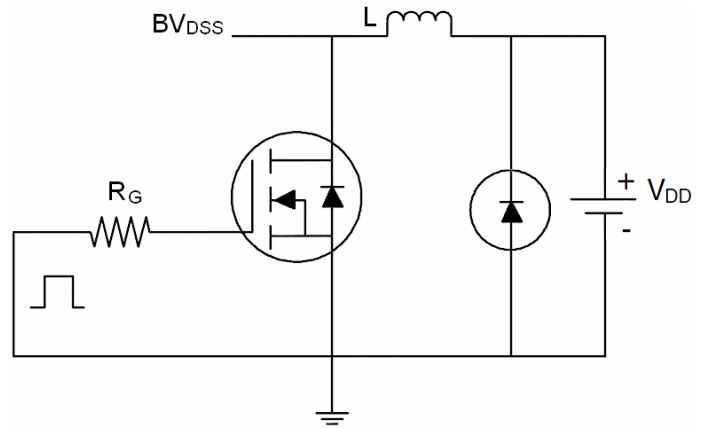
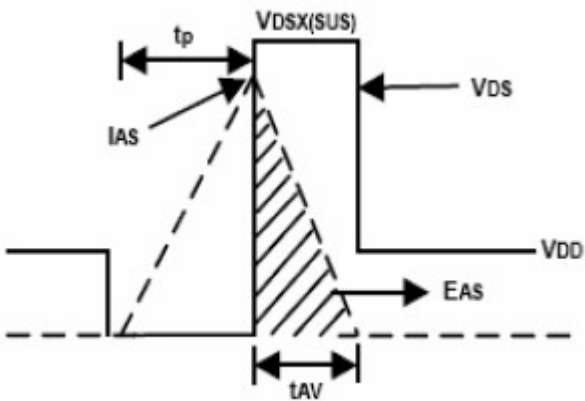
**Table 3. Electrical Characteristics (TA=25 $^{\circ}C$  unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	70		V
$I_{DSS}$	Zero Gate Voltage Drain Current(Tc=25 $^{\circ}C$ )	$V_{DS}=60V, V_{GS}=0V$			1	$\mu A$
$I_{DSS}$	Zero Gate Voltage Drain Current(Tc=100 $^{\circ}C$ )	$V_{DS}=60V, V_{GS}=0V$			5	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=40A$		9	11	m $\Omega$
<b>Dynamic Characteristics</b>						
$g_{FS}$	Forward Transconductance	$V_{DS}=10V, I_D=40A$	18			S
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V$ $f=1.0MHz$		2450		PF
$C_{oss}$	Output Capacitance			910		PF
$C_{rss}$	Reverse Transfer Capacitance			145		PF
$Q_g$	Total Gate Charge	$V_{DS}=30V, I_D=40A$ $V_{GS}=10V$		57		nC
$Q_{gs}$	Gate-Source Charge			15		nC
$Q_{gd}$	Gate-Drain Charge			24		nC
<b>Switching Times</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=30V, R_L=2.5\Omega$ $V_{GS}=10V, R_G=3\Omega$		32		nS
$t_r$	Turn-on Rise Time			240		nS
$t_{d(off)}$	Turn-Off Delay Time			120		nS
$t_f$	Turn-Off Fall Time			96		nS
<b>Source-Drain Diode Characteristics</b>						
$I_{SD}$	Source-Drain Current(Body Diode)			50		A
$I_{SDM}$	Pulsed Source-Drain Current(Body Diode)			200		A
$V_{SD}$	Forward On Voltage <sup>(Note 1)</sup>	$T_J=25^{\circ}C, I_{SD}=1A, V_{GS}=0V$		1.2	1.4	V
$t_{rr}$	Reverse Recovery Time <sup>(Note 1)</sup>	$T_J=25^{\circ}C, I_F=40A$ $di/dt=100A/\mu s$		64		nS
$Q_{rr}$	Reverse Recovery Charge <sup>(Note 1)</sup>			120		nC
$t_{on}$	Forward Turn-on Time	Intrinsic turn-on time is negligible(turn-on is dominated by $L_S+L_D$ )				

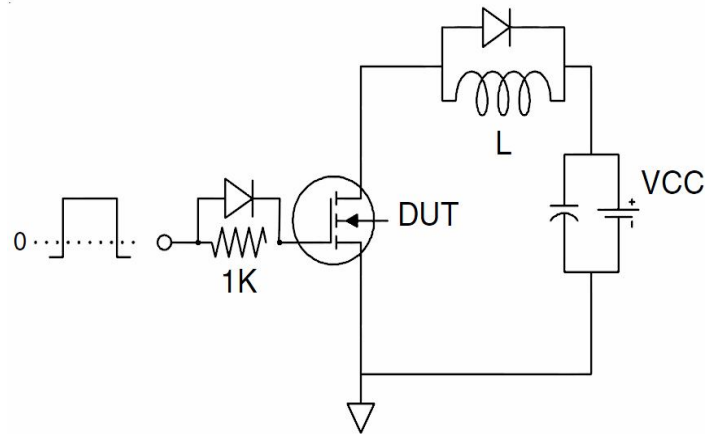
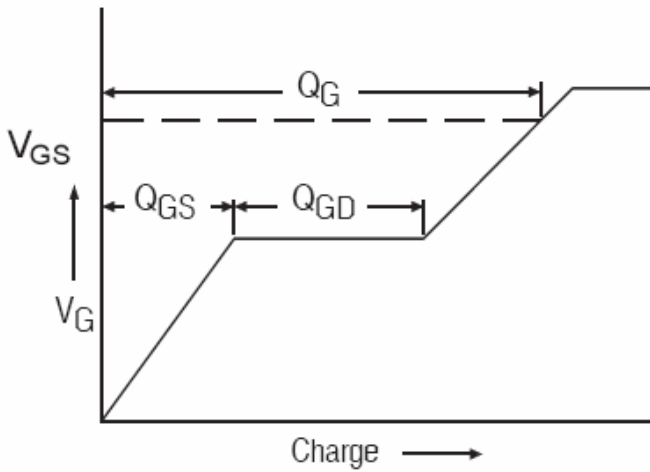
Notes 1. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 1.5\%$ , Starting  $T_J=25^{\circ}C$

## Test Circuit

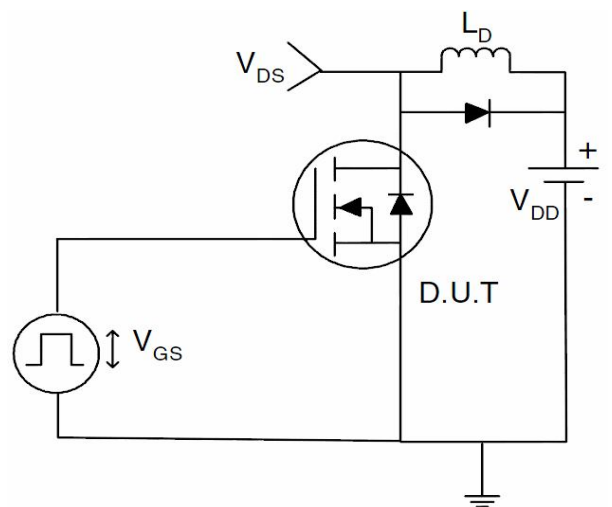
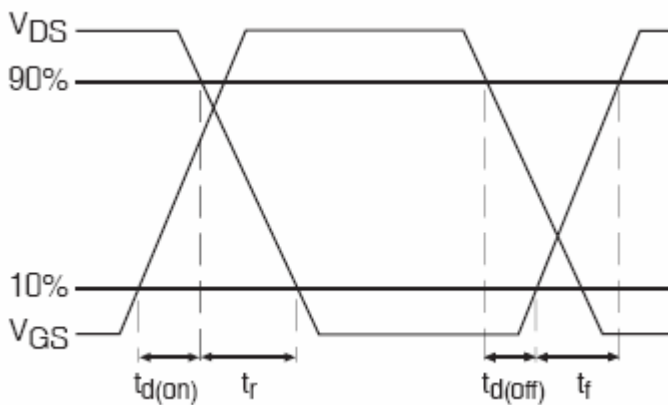
### 1) $E_{AS}$ Test Circuits



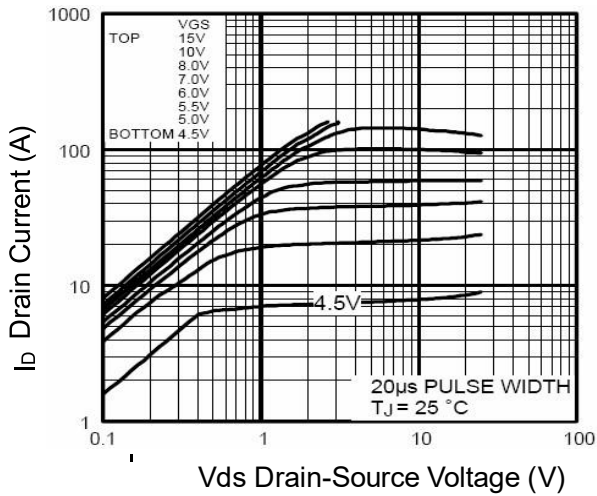
### 2) Gate Charge Test Circuit:



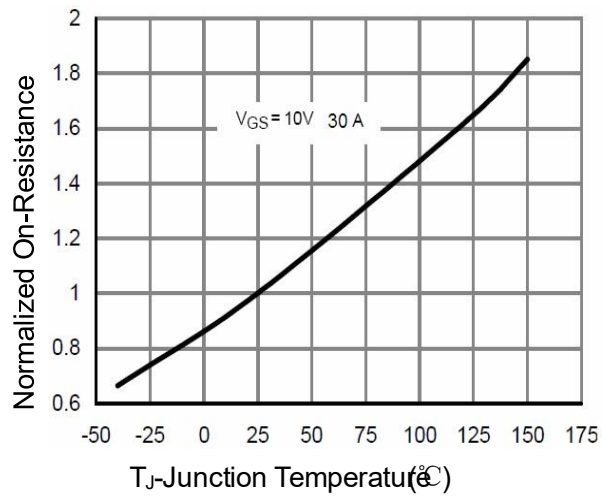
### 3) Switch Time Test Circuit:



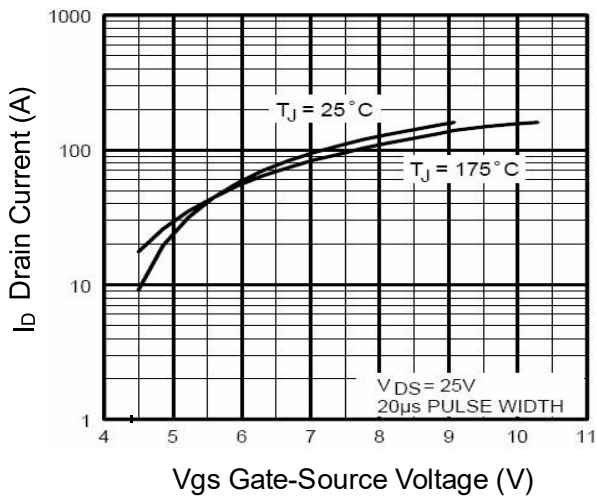
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)**



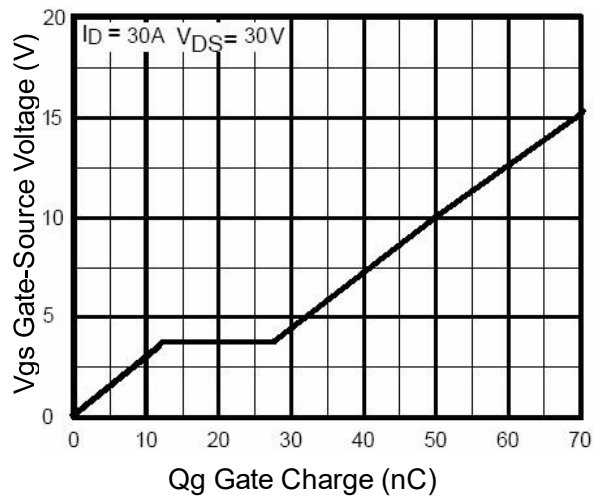
**Figure 1 Output Characteristics**



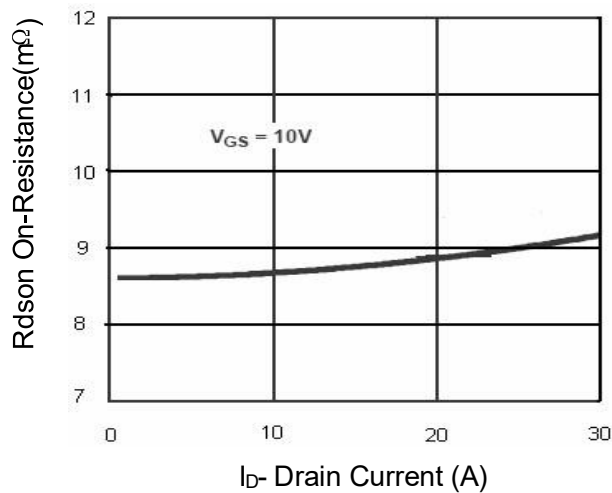
**Figure 4 Rdson-Junction Temperature**



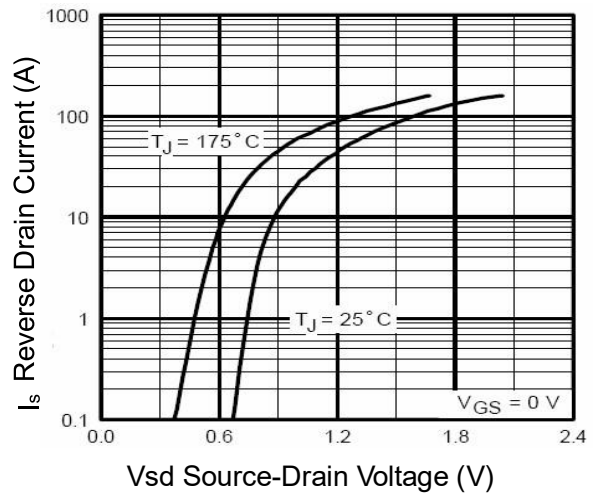
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**



**Figure 3 Rdson Drain Current**



**Figure 6 Source-Drain Diode Forward**

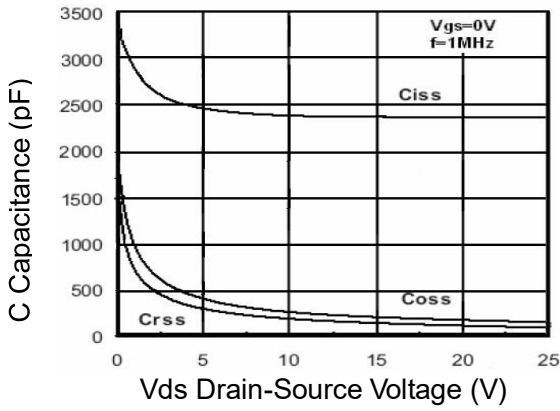


Figure 7 Capacitance vs Vds

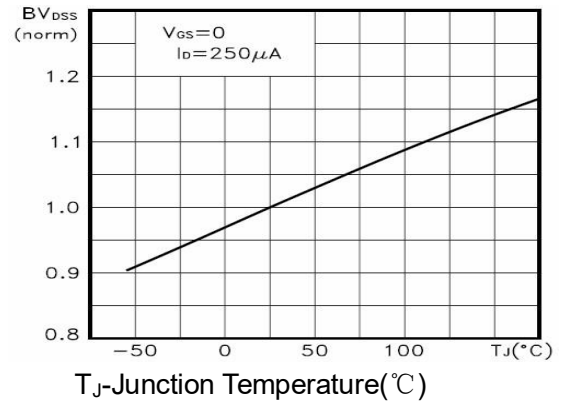


Figure 9  $BV_{DSS}$  vs Junction Temperature

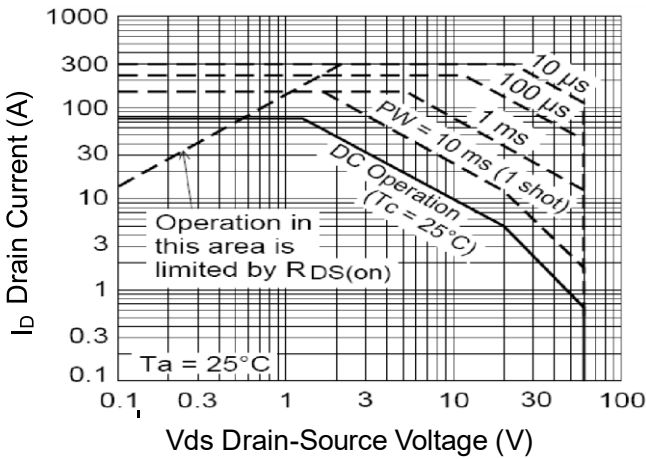


Figure 8 Safe Operation Area

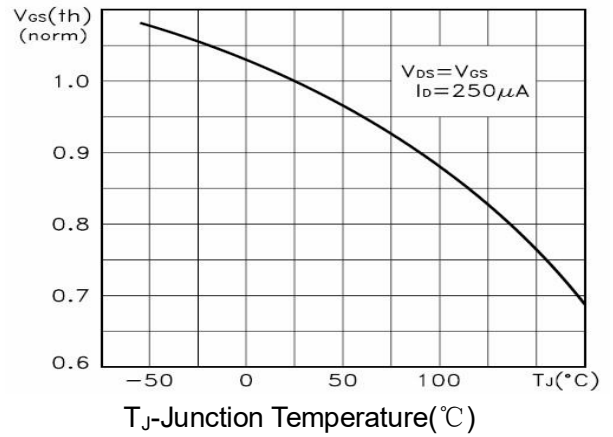


Figure 10  $V_{GS(th)}$  vs Junction Temperature

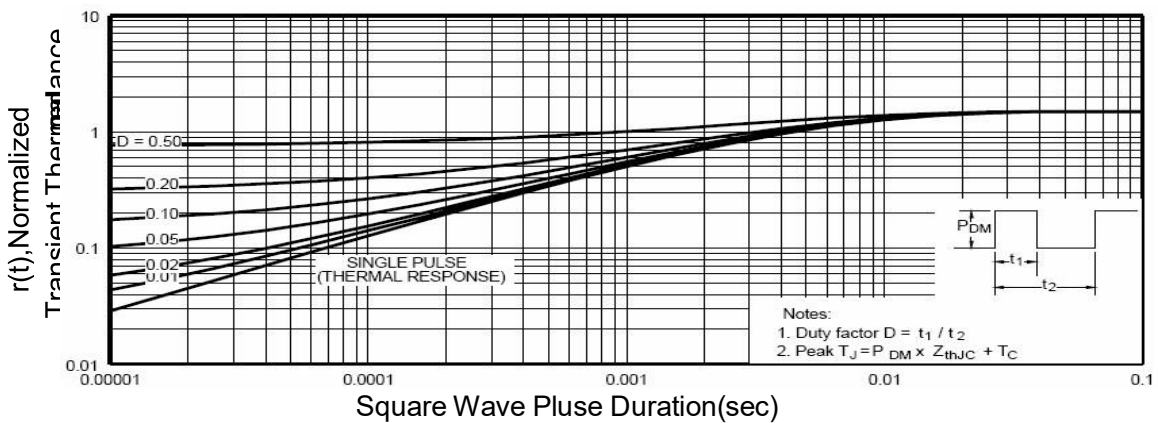
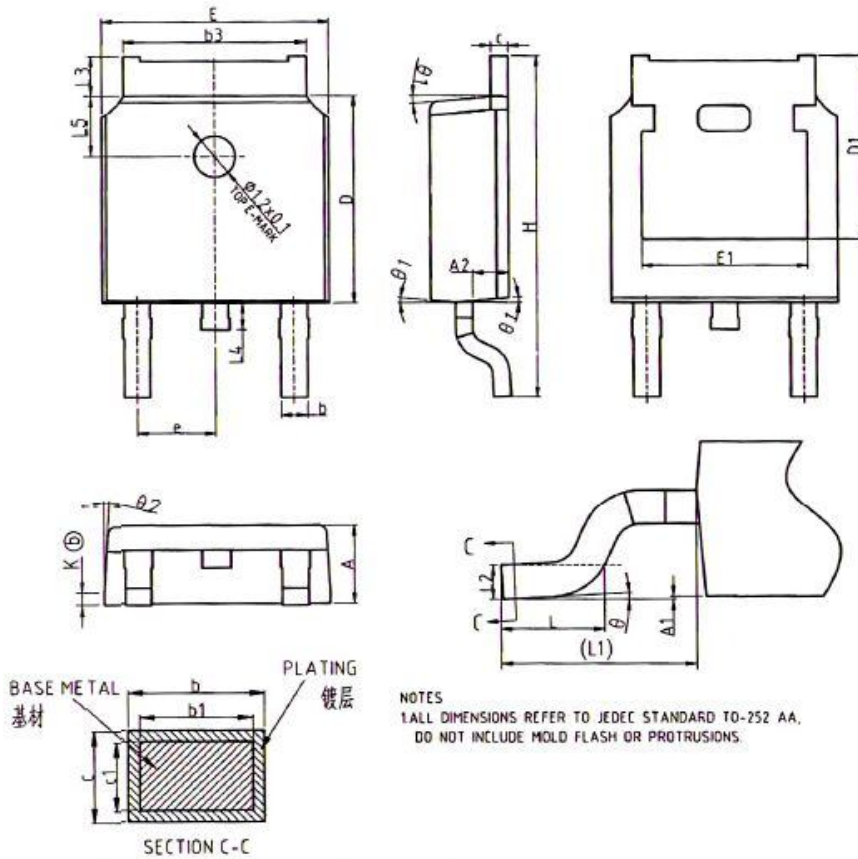


Figure 11 Normalized Maximum Transient Thermal Impedance

## TO-252 Package Information



COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.10
A2	0.97	1.07	1.17
b	0.72	0.78	0.85
b1	0.71	0.76	0.81
b3	5.23	5.33	5.46
c	0.47	0.53	0.58
c1	0.46	0.51	0.56
D	6.00	6.10	6.20
D1	5.30REF		
E	6.50	6.60	6.70
E1	4.70	4.83	4.92
e	2.286BSC		
H	9.90	10.10	10.30
L	1.40	1.50	1.70
L1	2.90REF		
L2	0.51BSC		
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5	1.70	1.80	1.90
$\theta$	0°	-	8°
$\theta_1$	5°	7°	9°
$\theta_2$	5°	7°	9°
K	0.10REF		

NOTES  
 1. ALL DIMENSIONS REFER TO JEDEC STANDARD TO-252 AA.  
 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

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