



**50A, 60V  
N-CHANNEL POWER MOSFET**

● **Features**

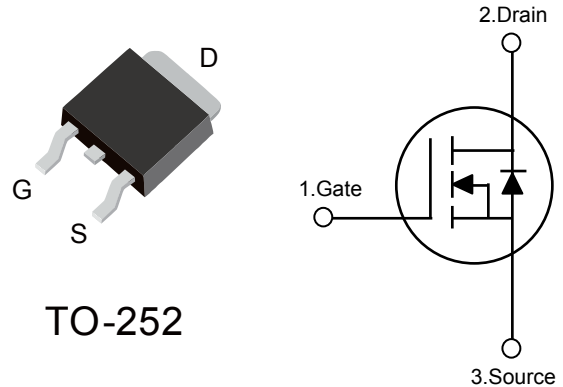
- Advanced process technology
- Ultra low On-Resistance
- 150°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to  $T_{jmax}$
- Lead-Free

● **Mechanical Data**

- Case: TO-252
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: TO-252, 0.315 Grams (Approximate)

**Product Summary**

$V_{DS}$	60	V
$R_{DS(ON)}$ Max.	16	mΩ
$I_D$	50	A



**ORDERING INFORMATION**

Order Number	Package	Pin Assignment			Packing
		1	2	3	
HPD160N06STA	TO-252 (DPAK)	G	D	S	Tube Reel

**ABSOLUTE MAXIMUM RATINGS** ( $T_C=25^\circ C$ , unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Drain source voltage	$V_{DS}$		60	V
Gate source voltage	$V_{GS}$		±20	
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	50	A
		$T_C=100^\circ C$	37	
Pulsed Drain Current	$I_{D,pulse}$	$T_C=25^\circ C$	200	
Power dissipation	$P_D$	$T_C=25^\circ C$	130	W
Operating and storage temperature	$T_J, T_{stg}$		-55 to 150	°C
Soldering Temperature, for 10 seconds		300 (1.6 mm from case)		

**Thermal characteristics**

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction-case	$R_{thJC}$	--	--	1.38	°C/W
Junction-to-Ambient	$R_{thJA}$	--	--	110	
Junction-to-Ambient (PCB Mount)	$R_{thJA}$	--	--	50	

**Electrical characteristics, at=25 °C, unless otherwise specified**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	--	--	V
Gate source voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.8	2.5	
Zero gate voltage drian current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V, T_J=25^\circ C$	--	0.1	1	$\mu A$
		$V_{DS}=60V, V_{GS}=0V, T_J=125^\circ C$	--	1	100	
Gate-source leakage current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$	--	$\pm 10$	$\pm 100$	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=25A$	--	16	20	m $\Omega$
		$V_{GS}=4.5V, I_D=15A$	--	19	30	
Transconductance	$g_{fs}$	$V_{DS}=25V, I_D=25A$	20	--	--	S

**Dynamic Characteristics**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
lutput capacitance	$C_{iss}$	$V_{GS}=0V$ $V_{DS}=10V$ $f=1MHz$	--	1000	--	pF
Output capacitance	$C_{oss}$		--	430	--	
Reverse transfer capacitance	$C_{rss}$		--	80	--	
Turn-on delay time	$t_{d(on)}$	$V_{DS}=30V$ $V_{GS}=10V$ $I_D=30A$ $R_G=3\Omega$	--	40	--	nS
Risse time	$t_r$		--	100	--	
Turn-off delay time	$t_{d(off)}$		--	80	--	
Fall time	$t_f$		--	30	--	

**Gate Charge Characteristics**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Gate to source charge	$Q_{gs}$	$V_{DS}=48V$ $I_D=50A$ $V_{GS}=10V$	--	10	--	nC
Gate to drain charge	$Q_{gd}$		--	11	--	
Gate charge total	$Q_g$		--	30	--	

**Reverse Diode**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Diode continuous forward current	$I_S$	$T_C=25^\circ C$	--	--	50	A
Diode pulse current	$I_{S,pulse}$	$T_C=25^\circ C$	--	--	200	
Diode forward voltage	$V_{SD}$	$V_{GS}=0V$ $I_F=50A, T_C=25^\circ C$	--	0.75	1.2	V
Reverse recovery time	$t_{rr}$	$V_R=20V, I_F=I_S$ $di_F/dt=100A/\mu s$	--	54	--	$\mu s$
Reverse recovery charge	$Q_{rr}$		--	80	--	nC



Test Circuits and Waveforms

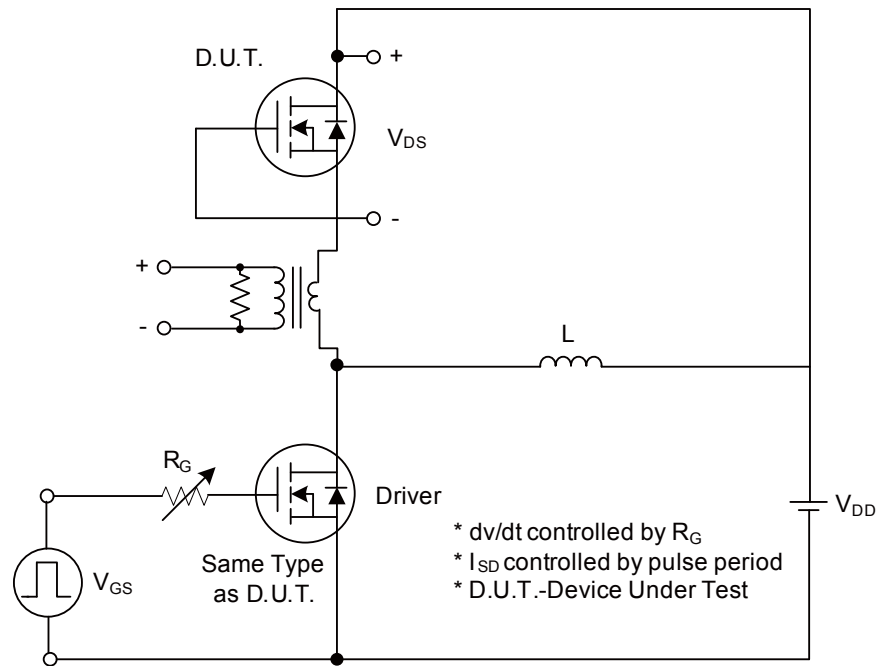


Fig- 1A Peak Diode Recovery dv/dt Test Circuit

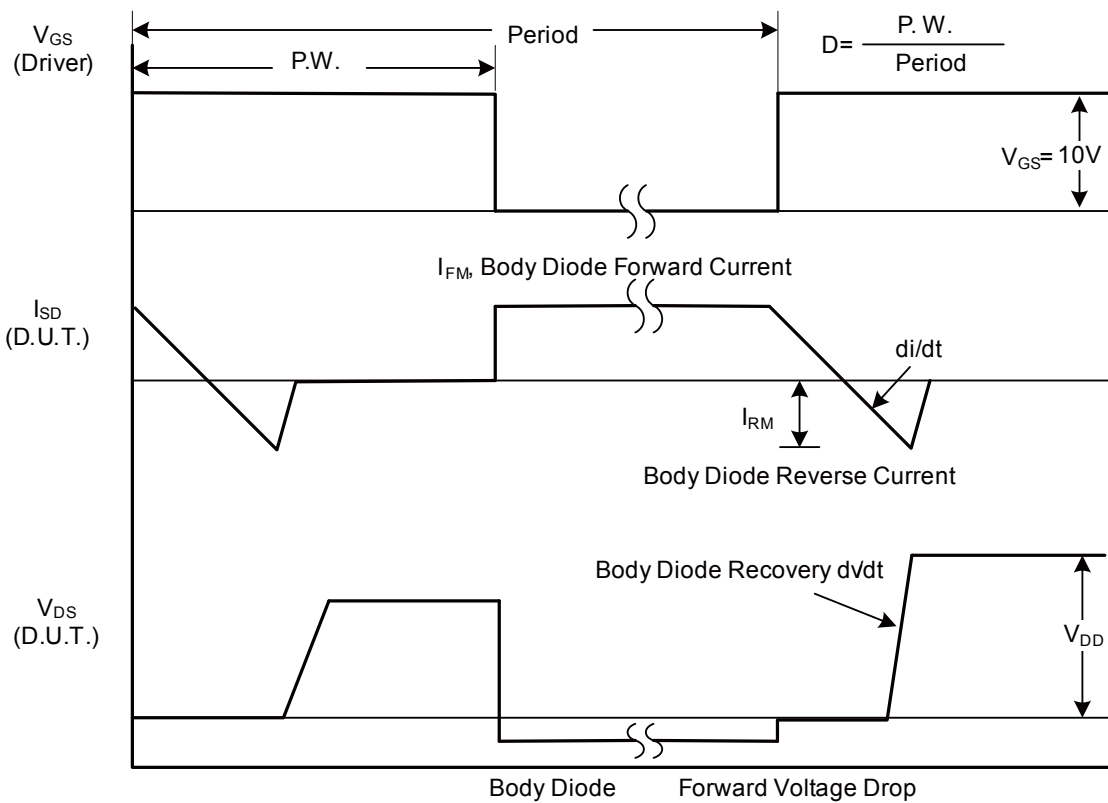


Fig- 1B : Peak Diode Recovery dv/dt Waveforms

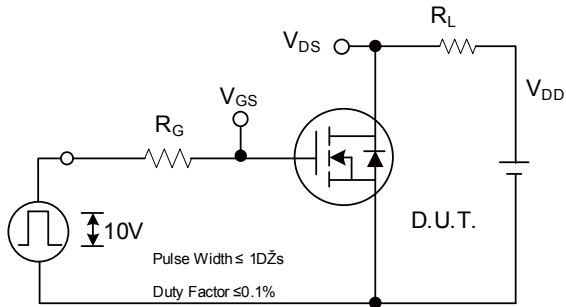


Fig-2A: Switching Test Circuit

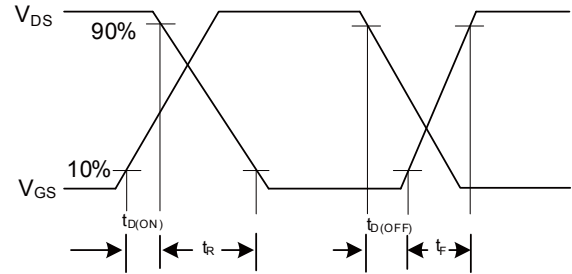


Fig-2B: Switching Waveforms

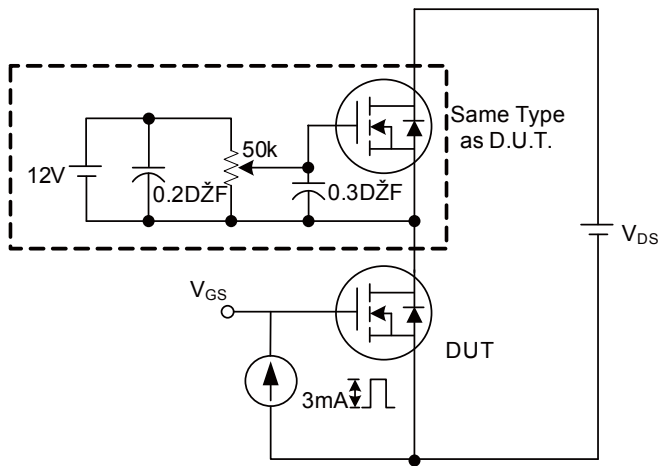


Fig-3A: Gate Charge Test Circuit

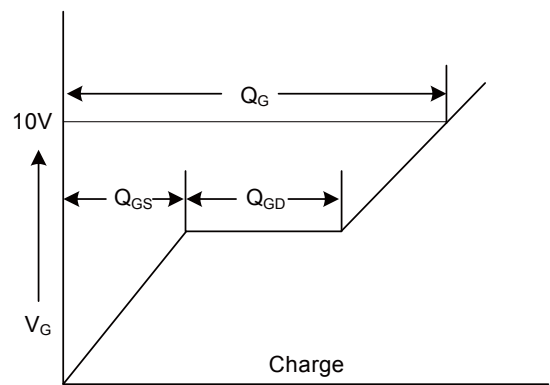


Fig-3B: Gate Charge Waveform

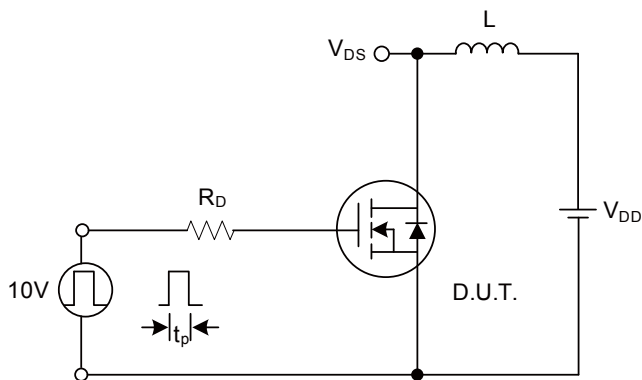


Fig. 4A : Unclamped Inductive Switching Test Circuit

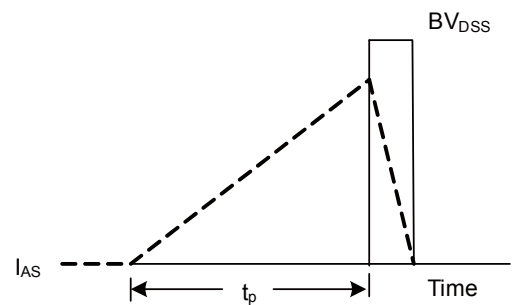


Fig- 4B : Unclamped Inductive Switching Waveforms



### Typical Performance Characteristics

Figure 1: Output Characteristics

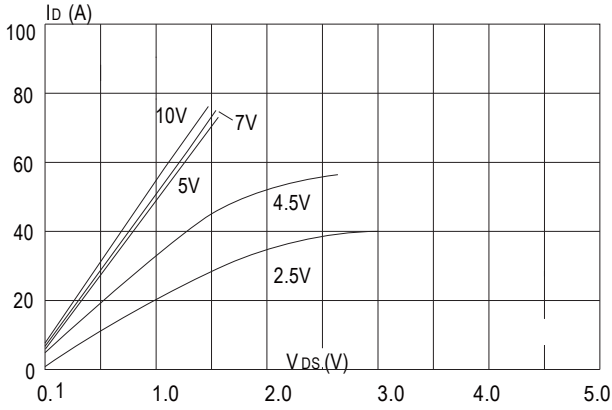


Figure 2: Typical Transfer Characteristics

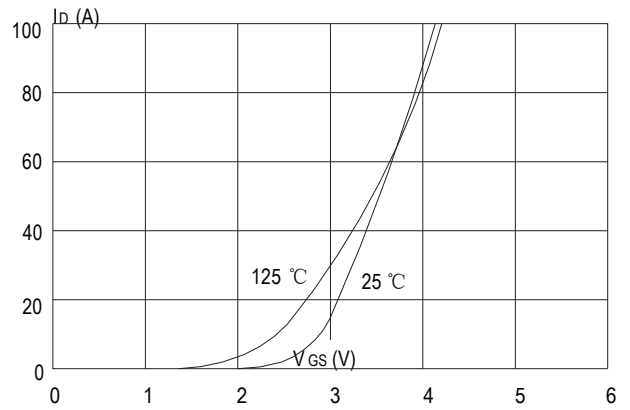


Figure 3: On-resistance vs. Drain Current

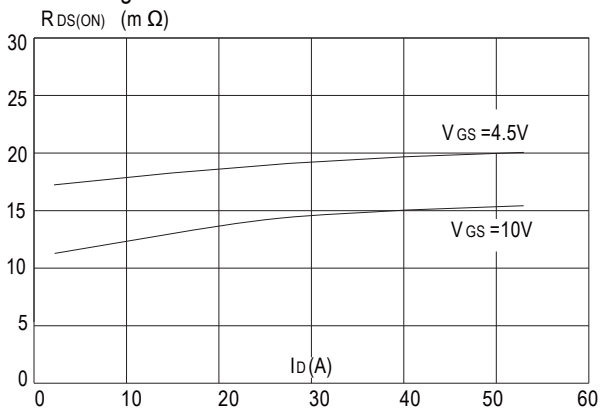


Figure 4: Body Diode Characteristics

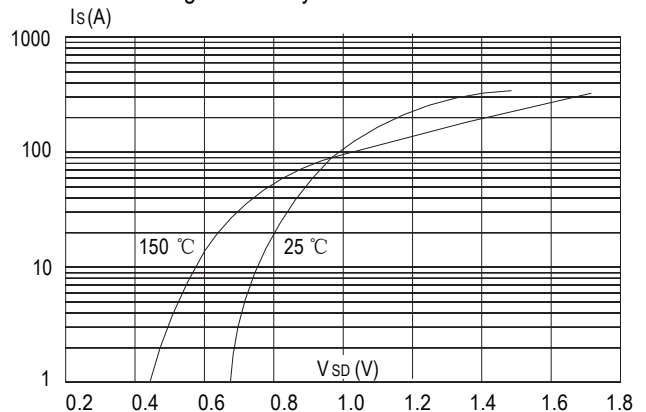


Figure 5: Gate Charge Characteristics

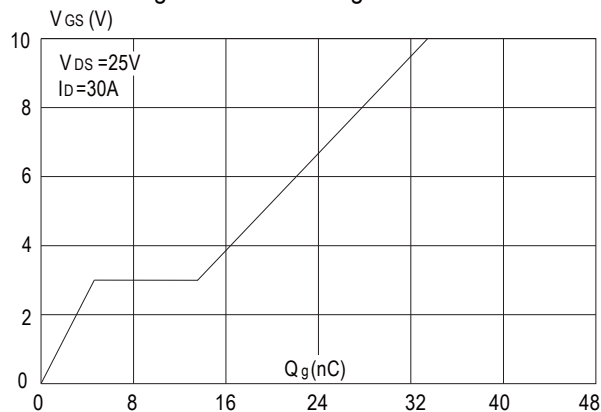


Figure 6: Capacitance Characteristics

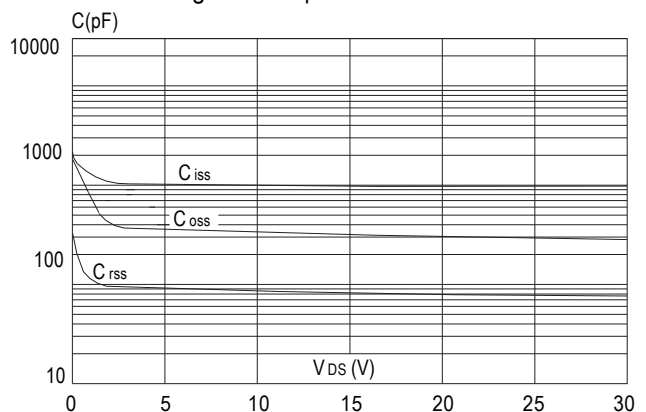




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

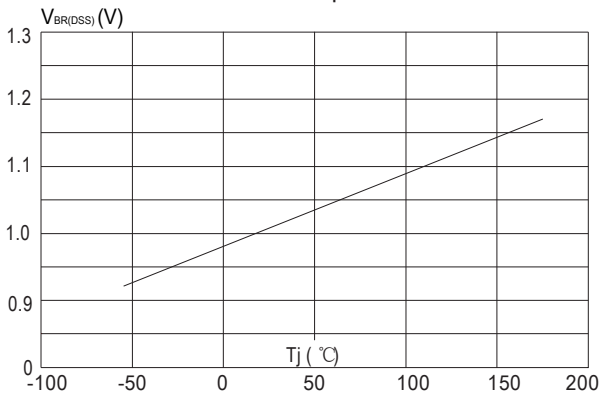


Figure 8: Normalized on Resistance vs. Junction Temperature

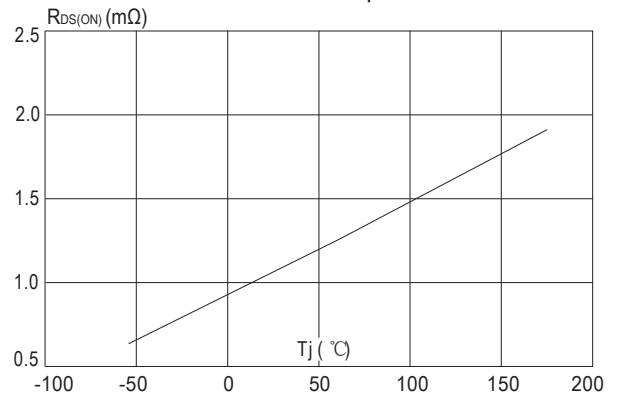


Figure 9: Maximum Safe Operating Area

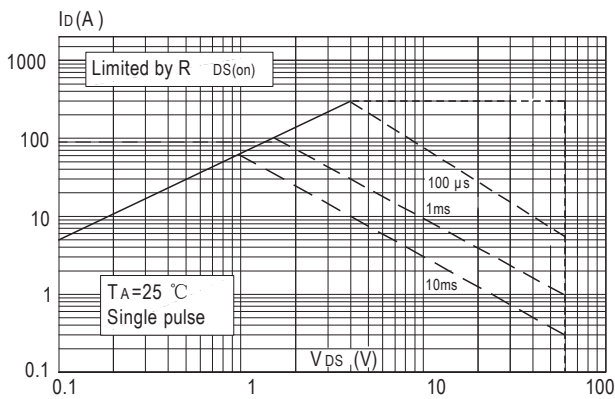


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

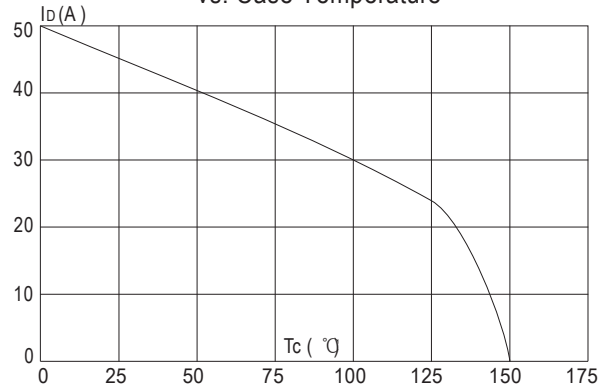
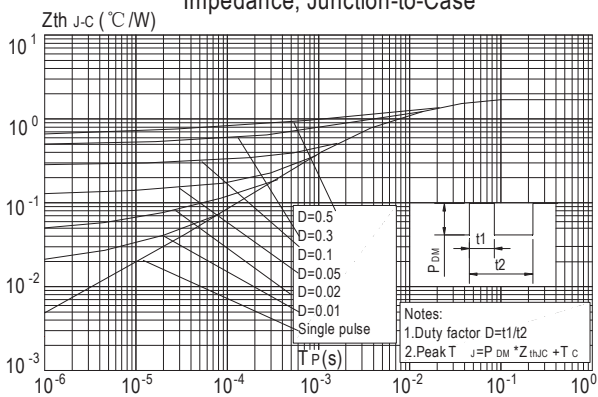


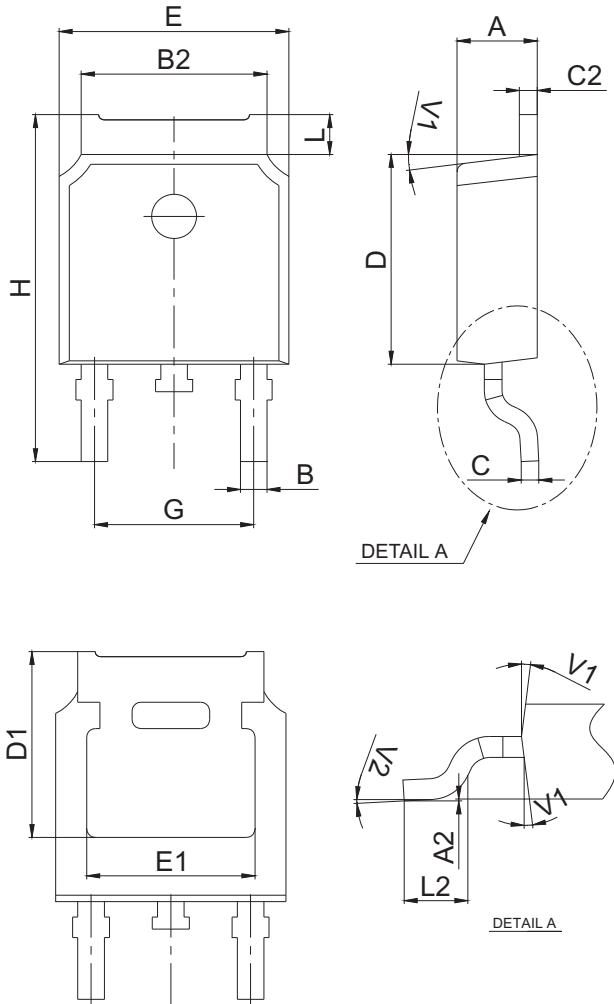
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case





TO-252 (DPAK) PACKAGE MECHANICAL DATA (mm & inch)

REF.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.10	2.50	0.083	0.098
A2	0	0.10	0	0.004
B	0.66	0.86	0.026	0.034
B2	5.18	5.48	0.202	0.216
C	0.40	0.60	0.016	0.024
C2	0.44	0.58	0.017	0.023
D	5.90	6.30	0.232	0.248
D1	5.30 REF		0.209 REF	
E	6.40	6.80	0.252	0.268
E1	4.63		0.182	
G	4.47	4.67	0.176	0.184
H	9.50	10.7	0.374	0.421
L	1.09	1.21	0.043	0.048
L2	1.35	1.65	0.053	0.065
V1	7° TYP.		7° TYP.	
V2	0°	6°	0°	6°







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