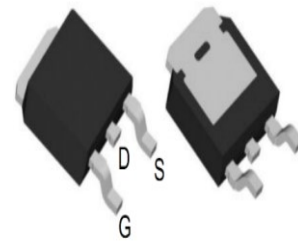


60V_{DS}/±20V_{GS} N-Channel Enhancement Mode MOSFET

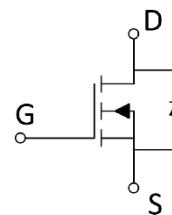
Features

- $V_{DS}=60V, I_D=50A$
- $R_{DS(ON)}=13m\Omega$ (TYP.) $V_{GS}=10V$
- $R_{DS(ON)}=18m\Omega$ (TYP.) $V_{GS}=4.5V$
- Reliable and Rugged
- Avalanche Rated
- Low On-Resistance
- High Current Capability

TO-252


Applications

- Load Switch
- Power management in portable/desktop PCs
- DC/DC conversion



Ordering Information

Device	package	Device Marking	Package Qty.
HAD6050	TO-252	D6050	2500/PCS

Absolute Maximum Ratings ($T_C=25^{\circ}C$, unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	60	V
Gate-Source Voltage ($V_{GS}=0V$, static)	V_{GS}	±20	V
Continuous Drain Current ($T_C=25^{\circ}C$)	I_D	50	A
Continuous Drain Current ($T_C=100^{\circ}C$)		35	A
Pulsed Drain Current	I_{DM}	150	A
Maximum Power Dissipation	P_D	60	W
Maximum Power Dissipation		0.4	W/ $^{\circ}C$
Single pulse avalanche energy	E_{as}	70	mJ
Operating, Storage Temperature Range	T_J, T_{STG}	-55~175	$^{\circ}C$

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	-	2.5	-	$^{\circ}C/W$

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate -Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.6	3	V
Drain-Source On-state Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	13	18	m Ω
		$V_{GS}=4.5V, I_D=20A$	-	18	27	

Dynamic Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$V_{DS}=15V$ $V_{GS}=0V$ $f=1MHz$	-	1122	-	pF
Output capacitance	C_{oss}		-	138	-	
Reverse transfer capacitance	C_{rss}		-	10	-	
Gate Resistance	R_g	$f=1MHz$	-	1.5	-	Ω
Total Gate Charge	Q_g	$V_{DS}=15V$ $V_{GS}=10V$ $I_D=20A$	-	23	-	nC
Gate Source Charge	Q_{gs}		-	7	-	
Gate Drain Charge	Q_{gd}		-	4.5	-	
Turn-on delay Time	$t_{d(on)}$	$V_{GS}=10V$ $V_{DS}=15V$ $R_L=0.75\Omega$ $R_G=3\Omega$	-	10	-	ns
Rise time	t_r		-	8	-	
Turn-off delay Time	$t_{d(off)}$		-	30	-	
Fall time	t_f		-	5	-	

Reverse Diode Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Body Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{SD}=1A$	-	0.85	1.2	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_{SD}=20A$ $d_i/d_t=500A/\mu s$	-	22	-	ns
Reverse Recovery Charge	Q_{rr}		-	11	-	nC

Electrical Characteristics Diagrames

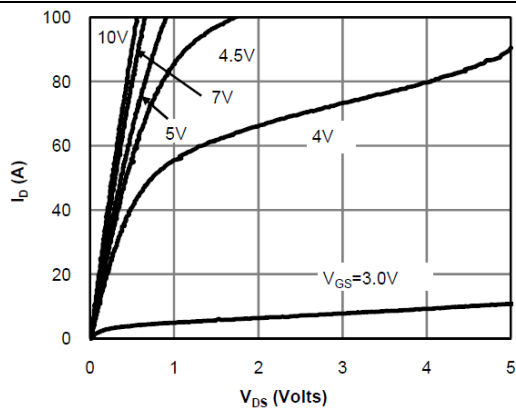
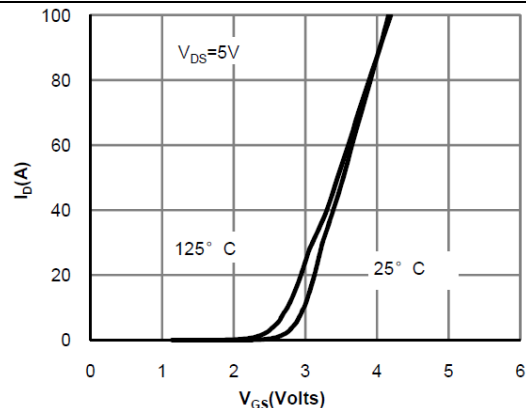
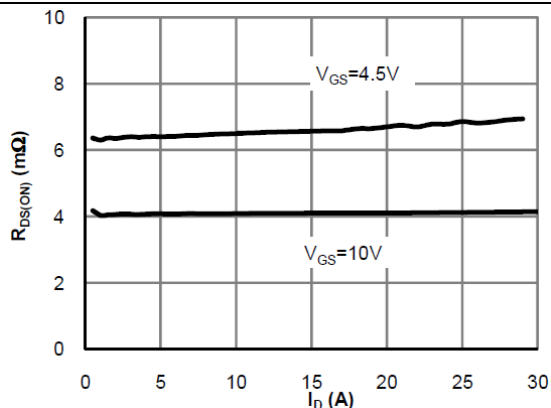
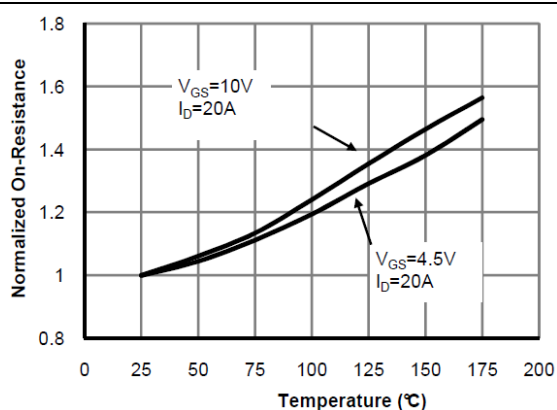
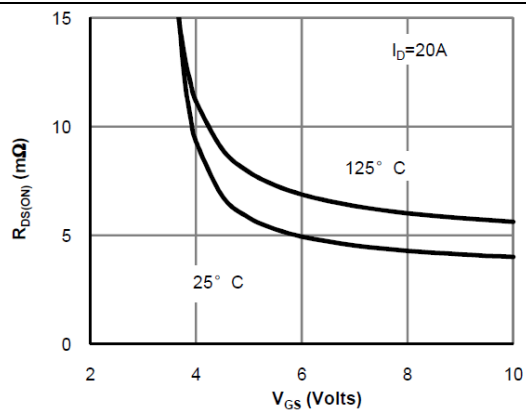
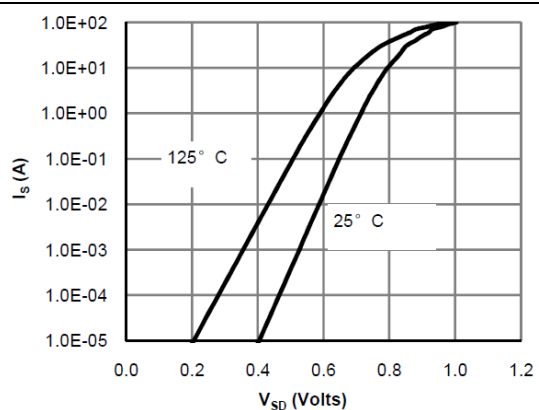
Figure 1. On-Regin Characteristics

Figure 2. Transfer Characteristics

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

Figure 4. On-Resistance vs. Junction Temperature

Figure 5. On-Resistance vs. Gate-Source Voltage

Figure 6. Body-Diode Characteristics


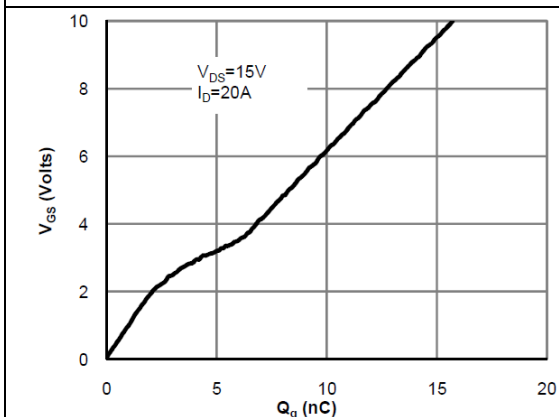
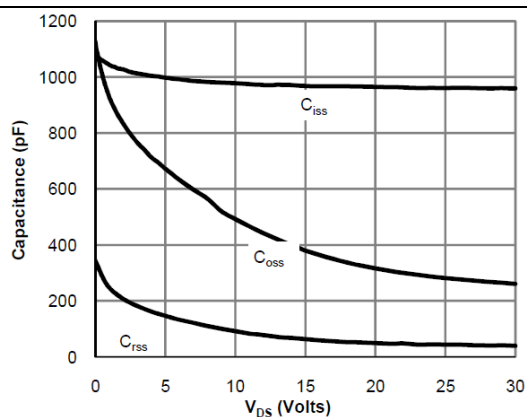
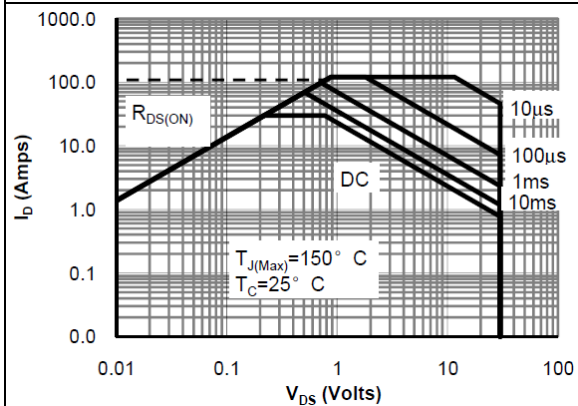
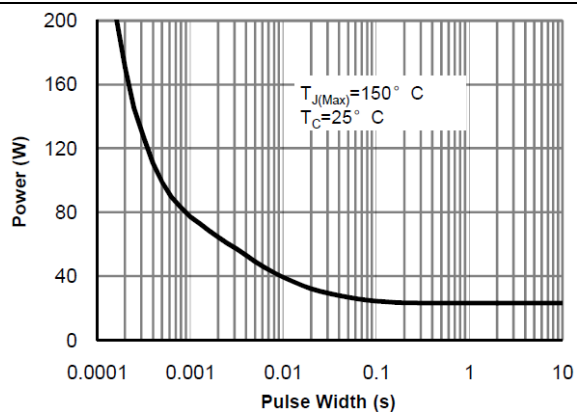
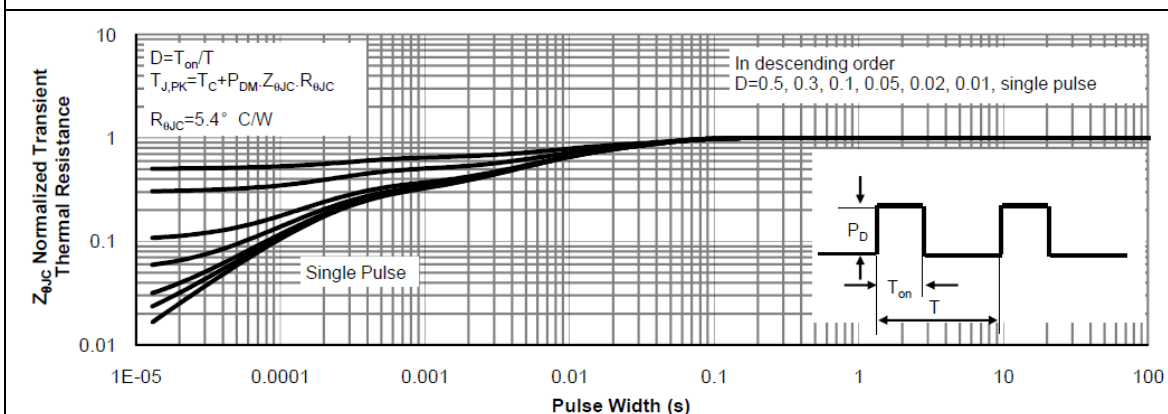
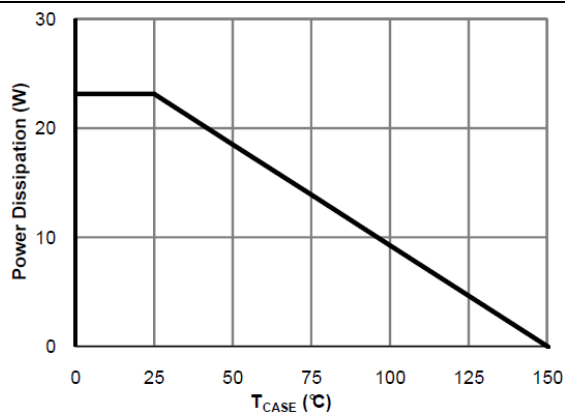
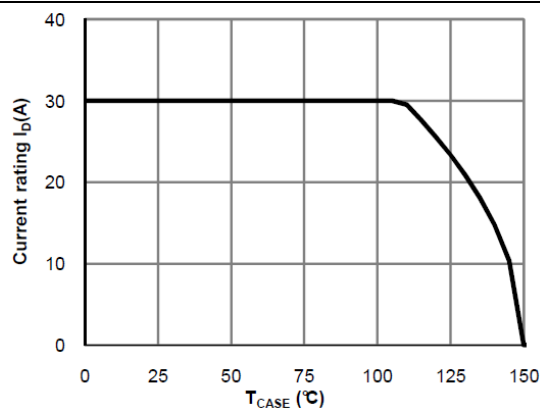
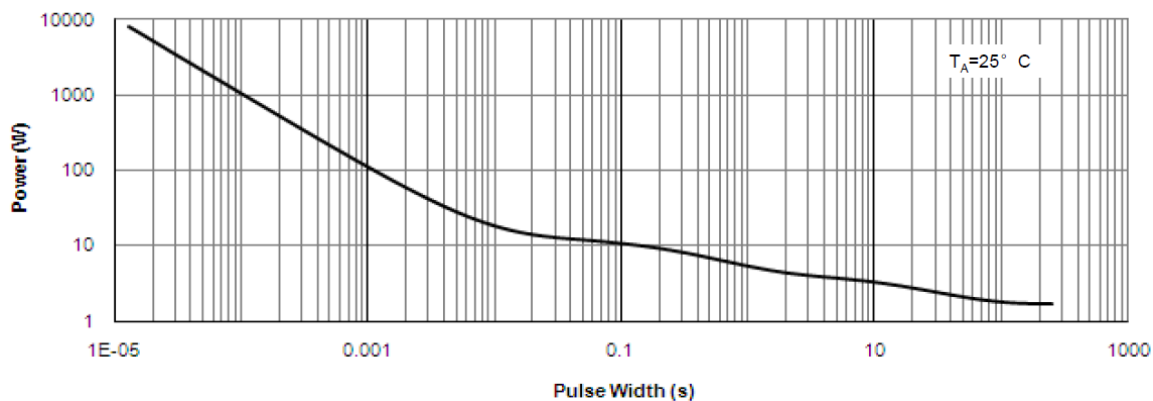
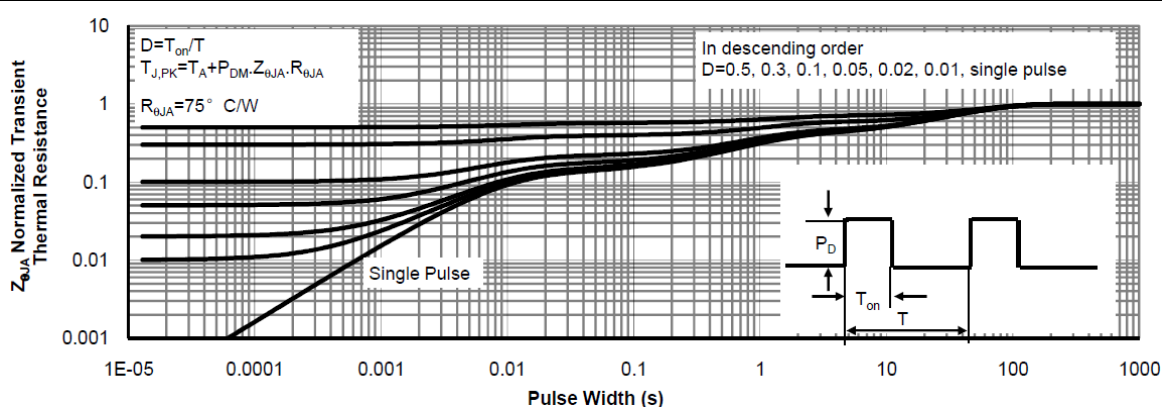
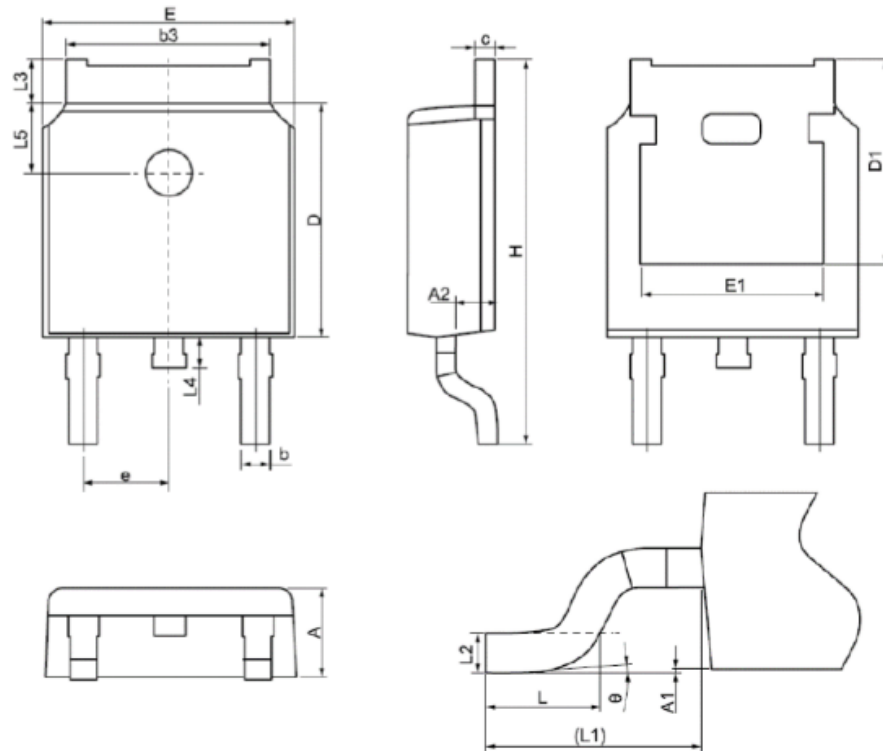
Figure 7. Gate-Charge Characteristics

Figure 8. Capacitance Characteristics

Figure 9. Maximum Forward Biased Safe Operating Area

Figure 10. Single Pulse Power Rating Junction-to-Case

Figure 11. Normalized Maximum Transient Thermal Impedance


Figure 12. Power De-rating

Figure 13. Current De-rating

Figure 14. Single Pulse Power Rating Junction-to-Ambient

Figure 15. Normalized Maximum Transient Thermal Impedance


Physical Dimensions

TO-252



Symbol	Dimension (mm)			Symbol	Dimension (mm)		
	Min	Nom	Max		Min	Nom	Max
A	2.20	2.30	2.40	e	2.286(BSC)		
A1	0.00	-	0.20	H	9.40	10.10	10.50
A2	0.97	1.07	1.17	L	1.38	1.50	1.75
b	0.68	0.78	0.90	L1	2.90(REF)		
b3	5.20	5.33	5.50	L2	0.51(BSC)		
c	0.43	0.53	0.63	L3	0.88	-	1.28
D	5.98	6.10	6.22	L4	0.50	-	1.00
D1	5.30(REF)			L5	1.65	1.80	1.95
E	6.40	6.60	6.80	θ	0°	-	8°
E1	4.63	-	-	-	-	-	-

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