Features

- Super Low Gate Charge
- Green Device Available
- 100% EAS Guaranteed
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology

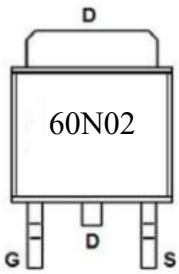
Bvdss	Rdson	ID
20V	4.7mΩ	60A

Application

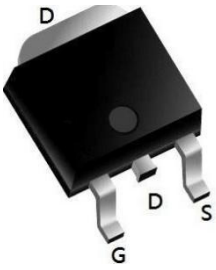
- PWM applications
- Load Switch
- Power management

RoHS

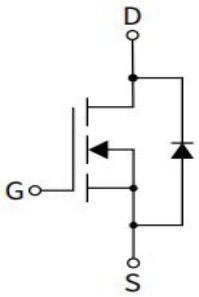
Package



Marking and pin assignment



TO252-3L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
60N02	60N02	TO252-3L	2500

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current, V_{GS}@10V[1]	T_C = 25℃	I_D	60	A
	T_C = 100℃		35	A
Pulsed Drain Current[2]		I_{DM}	240	A
Single Pulse Avalanche Energy[3]		EAS	48	mJ
Avalanche Current		I_{AS}	31	A
Total Power Dissipation[4]	T_C = 25℃	P_D	38	W
Storage Temperature Range		T_{STG}	-55 ~ 150	℃
Operating Junction Temperature Range		T_J	-55 ~ 150	℃

Thermal Resistance Ratings

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	--	--	℃/W
Thermal Resistance Junction-case[1]	$R_{\theta JC}$	--	4.2	℃/W

Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free		G	D	S	
HL60N02	TO252-3L	1	2	3	Tape Reel

Electrical Characteristics (T_J=25℃unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250uA,V_{GS}=0V	20	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V	-	-	1	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS},I_D=250uA	0.4	0.7	1	V
Static Drain-Source On-Resistance[3]	$R_{DS(on)}$	V_{GS}=4.5V,I_D=25A	-	4.7	6.5	mΩ
		V_{GS}=2.5V,I_D=15A	-	6.8	10	
Input Capacitance	C_{iss}	V_{DS}=10V,V_{GS}=0V,f=1MHz	-	1832	-	pF
Output Capacitance	C_{oss}		-	289	-	
Reverse Transfer Capacitance	C_{rss}		-	271	-	
Total Gate Charge	Q_g	V_{GS}=4.5V,V_{DS}=10V,I_D=25A	-	23	-	nC
Gate-Source Charge	Q_{gs}		-	4.5	-	
Gate-Drain Charge	Q_{gd}		-	7.3	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS}=4.5V,V_{DS}=10V, I_D=25A, R_G=3Ω	-	15	-	ns
Turn-On Rise Time	t_r		-	37	-	
Turn-Off Delay Time	$t_{r(off)}$		-	52	-	
Turn-Off Fall Time	t_f		-	21	-	
Maximum Continuous Drain to Source Diode Forward Current		I_S	-	-	60	A
Maximum Pulsed Drain to Source Diode Forward Current		I_{SM}	-	-	240	A
Diode Forward Voltage	V_{GS}=0V,I_S=30A	V_{SD}	-	-	1.2	V
Reverse Recovery Time	I_F=25A,dI/dt=100A/μs	t_{rr}	-	25	-	ns
Reverse Recovery Charge		Q_{rr}	-	21	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T_J=25℃, V_{DD}=15V, V_G=4.5V, R_G=25Ω, L=0.5mH, I_{AS}=13.8A
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Typical Performance Characteristics

Figure1: Output Characteristics

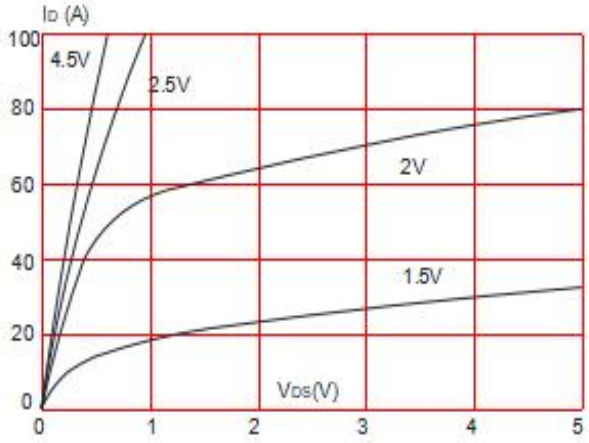


Figure 2: Typical Transfer Characteristics

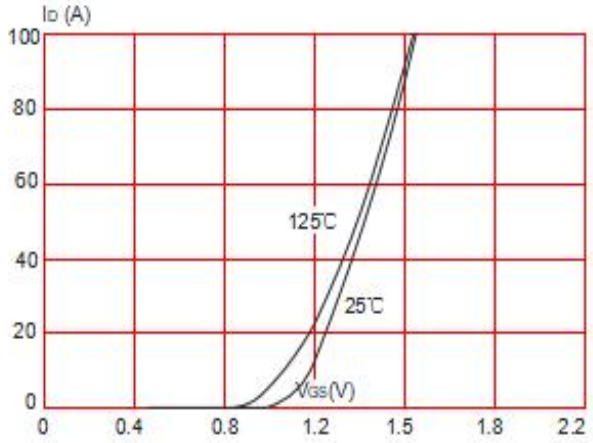


Figure 3: On-resistance vs. Drain Current

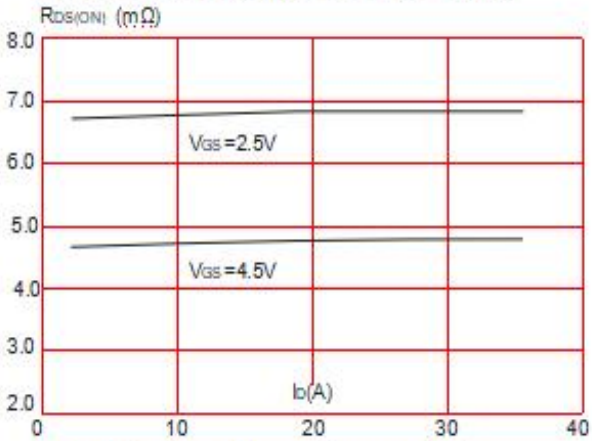


Figure 4: Body Diode Characteristics

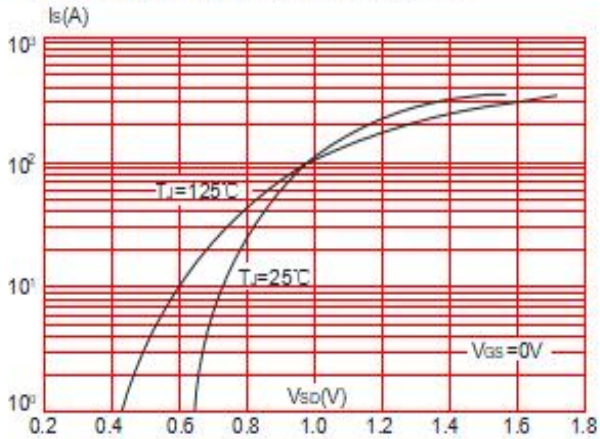


Figure 5: Gate Charge Characteristics

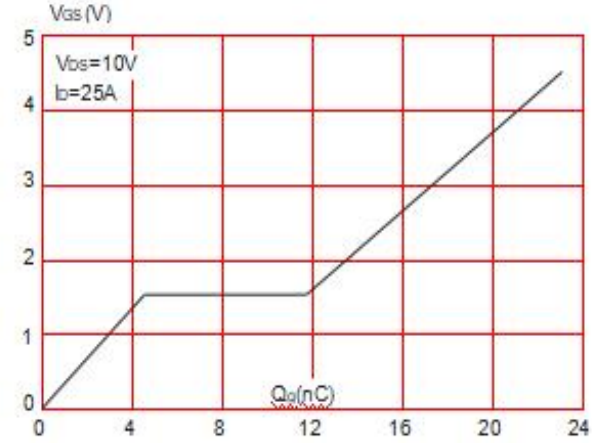


Figure 6: Capacitance Characteristics

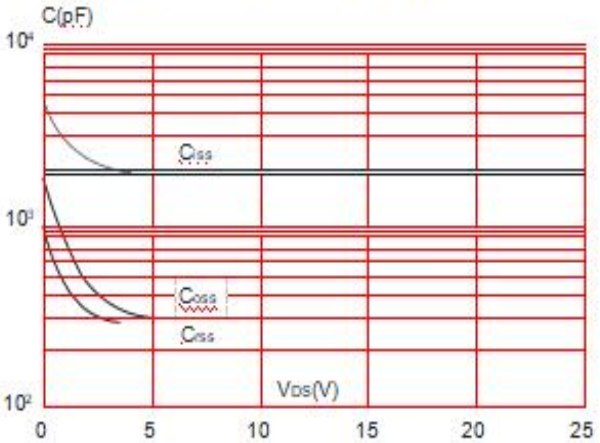


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

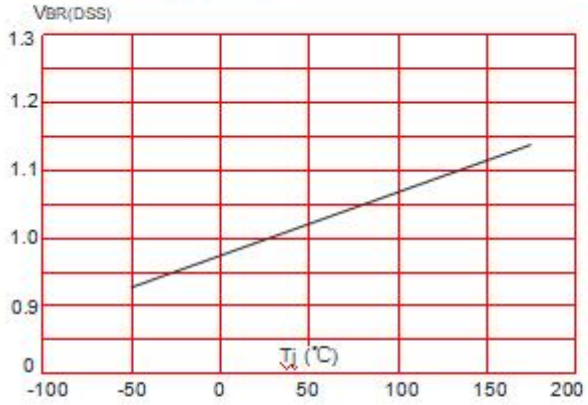


Figure 8: Normalized on Resistance vs. Junction Temperature

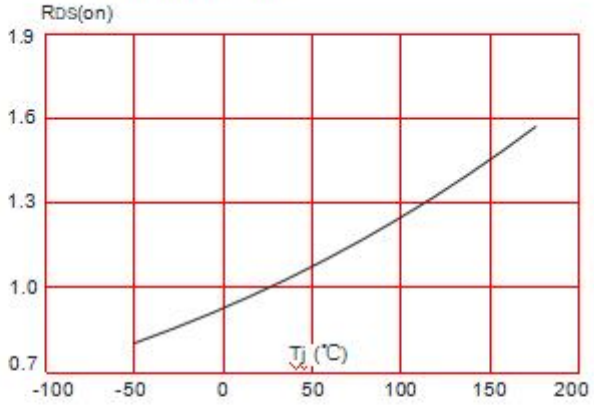


Figure 9: Maximum Safe Operating Area

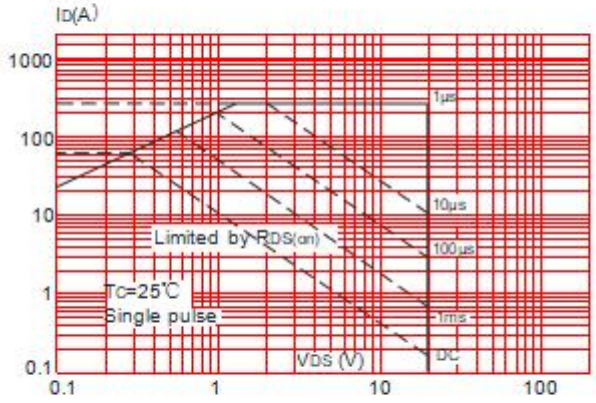


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

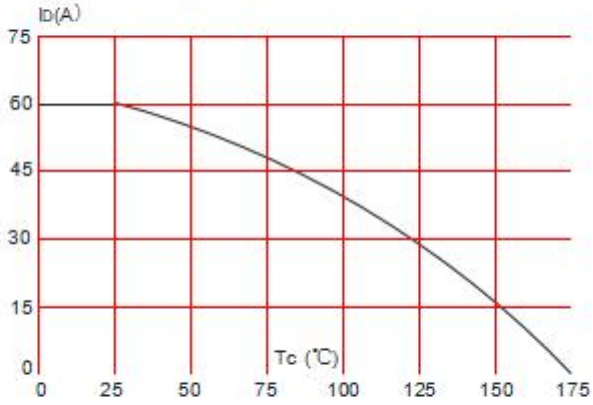
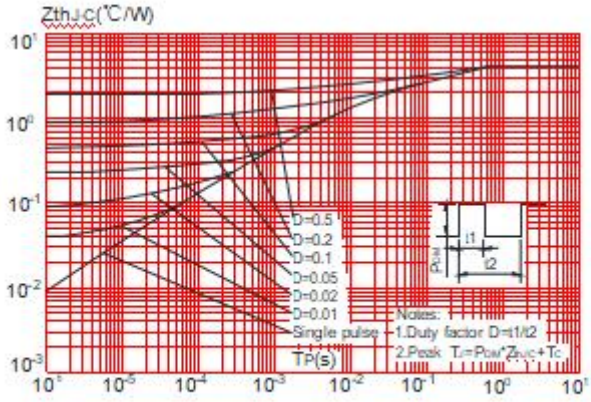
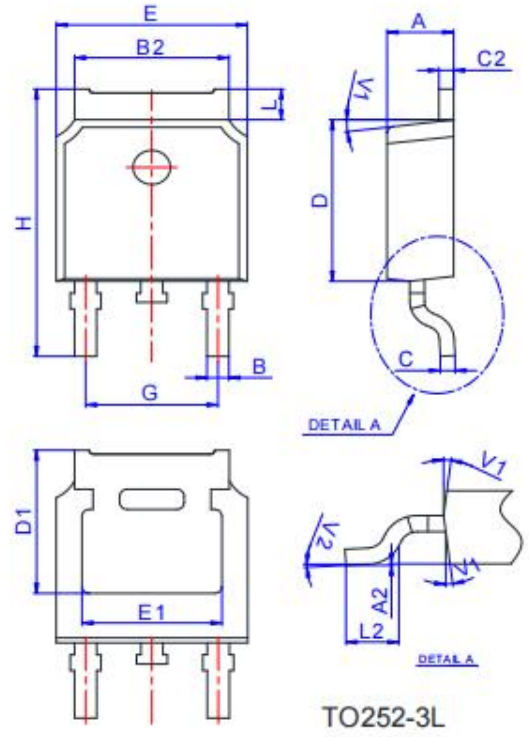


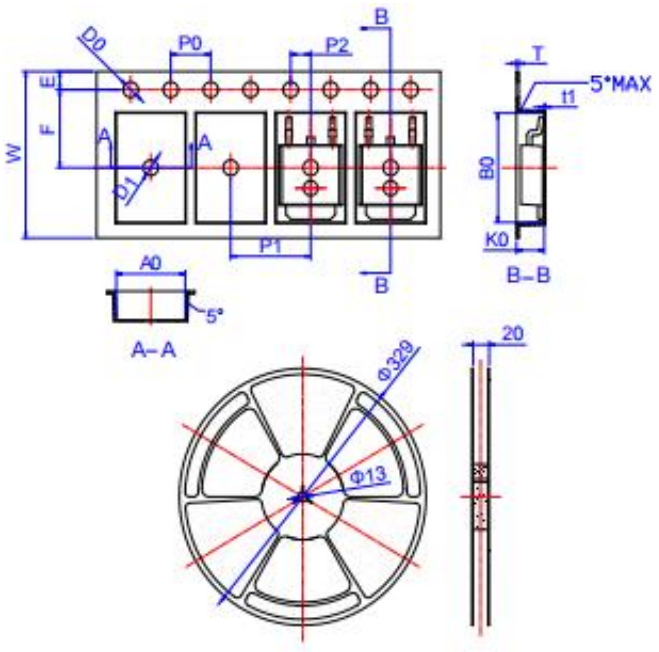
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Package Mechanical Data TO252-3L



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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	5.30REF			0.209REF		
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		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583

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