Description

Features

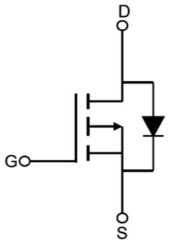
- V_{DS}=-20V, I_D=-60A
  $R_{DS(ON)}$ <8.5mΩ @ V_{GS} = -4.5V
  $R_{DS(ON)}$ <12mΩ @ V_{GS} = -2.5V
- High Power and Current Handing Capability
- Lead Free Product is Acquired
- Surface Mount Package

Application

- PWM Applications
- Load Switch

100% UIS
100% ΔVds

TO-252



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
VSM60P02-T2	VSM60P02	TAPING	TO-252	13inch	2500	25,000

Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter		Max.	Units
V_{DSS}	Drain-Source Voltage		-20	V
V_{GSS}	Gate-Source Voltage		±12	V
I_D	Continuous Drain Current	T_C = 25℃	-60	A
		T_C = 100℃	-39	
I_{DM}	Pulsed Drain Current note1		-240	A
P_D	Power Dissipation	T_C= 25℃	70	W
$R_{\theta JC}$	Thermal Resistance, Junction to Ambient		2.1	℃/ W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	℃

Electrical Characteristics (T_J=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D= -250μA	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -20V, V_{GS} = 0V,	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS} =0V, V_{GS} = ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D= -250μA	-0.35	-0.65	-1.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note3	V_{GS} =-4.5V, I_D =-15A	-	6.6	8.5	mΩ
		V_{GS} =-2.5V, I_D =-12A	-	8	12	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} =-10V, V_{GS} =0V, f = 1.0MHz	-	4590	-	pF
C_{oss}	Output Capacitance		-	505	-	pF
C_{rss}	Reverse Transfer Capacitance		-	440	-	pF
Q_g	Total Gate Charge	V_{DS} =-10V, I_D =-15A, V_{GS} =-4.5V	-	46	-	nC
Q_{gs}	Gate-Source Charge		-	7.3	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	10	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD} =-10V, I_D =-14A, R_{GEN}=2.7Ω, V_{GS} =-10V	-	8	-	ns
t_r	Turn-on Rise Time		-	59	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	111	-	ns
t_f	Turn-off Fall Time		-	43	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-60	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-240	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S =-20A	-	-	-1.2	V
trr	Reverse Recovery Time	T_J=25℃,I_{SD}=-15A, V_{GS}=0V di/dt=-100A/μs	-	18	-	ns
Qrr	Reverse Recovery Charge		-	7.7	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: T_J=25℃,V_{DD}=-10V,V_G=-10V, R_G=5.9Ω, L=0.5mh,I_{AS}=-13.2A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Typical Performance Characteristics

Figure1: Output Characteristics

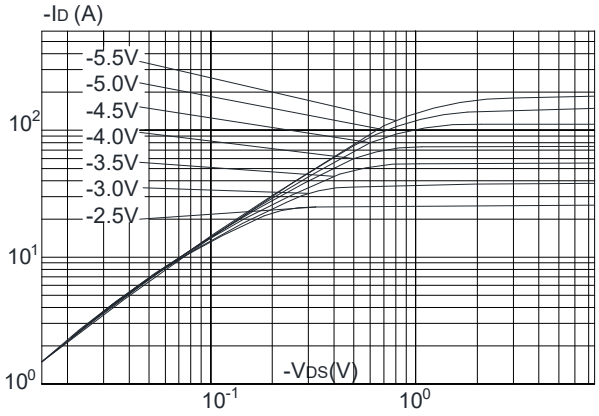


Figure 2: Typical Transfer Characteristics

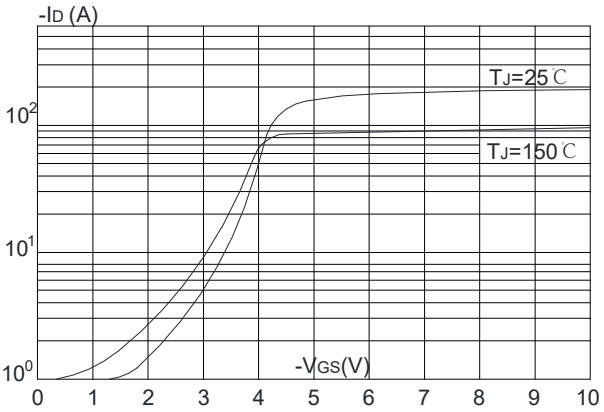


Figure 3: On-resistance vs. Drain Current

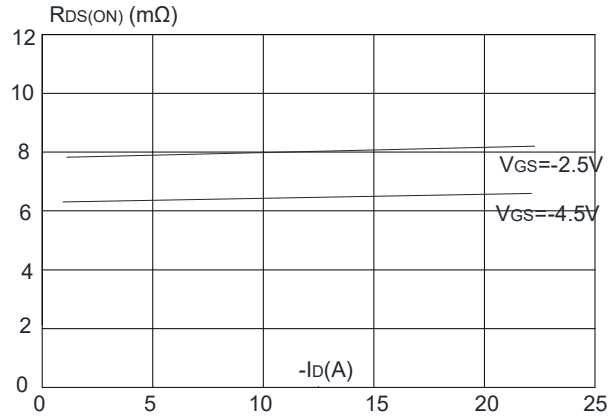


Figure 4: Body Diode Characteristics

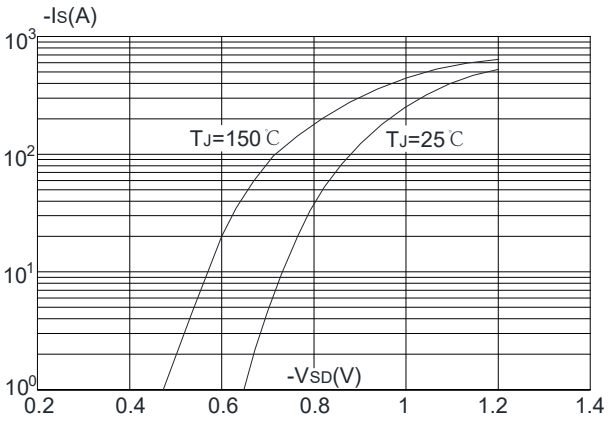


Figure 5: Gate Charge Characteristics

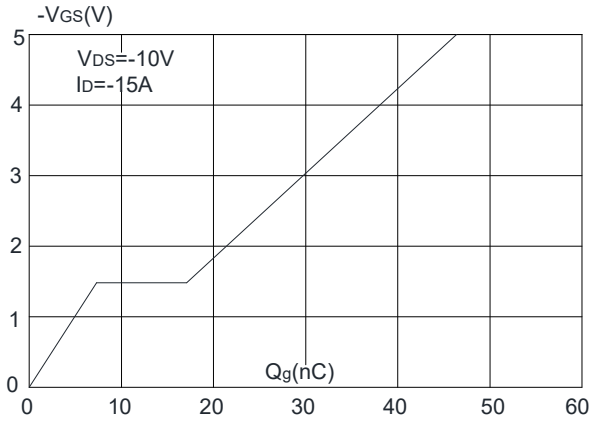


Figure 6: Capacitance Characteristics

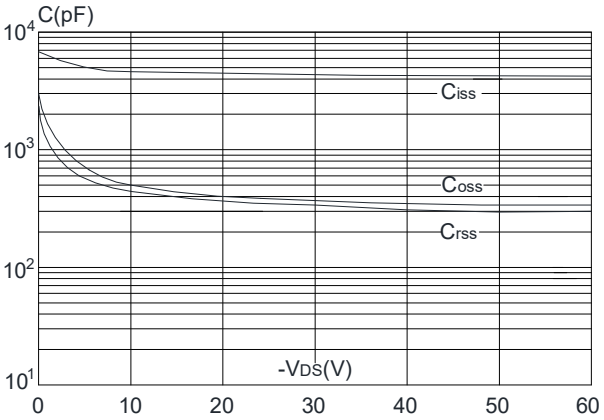


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

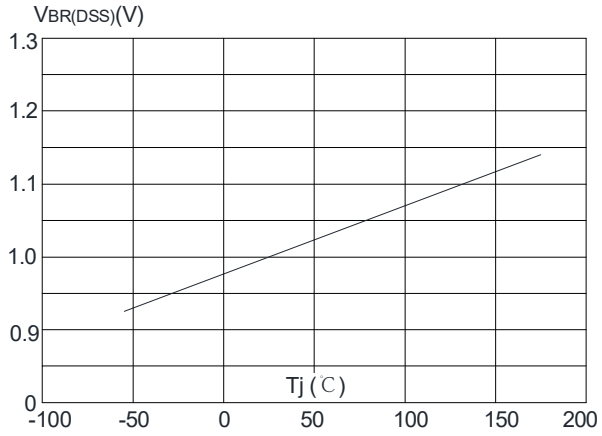


Figure 8: Normalized on Resistance vs. Junction Temperature

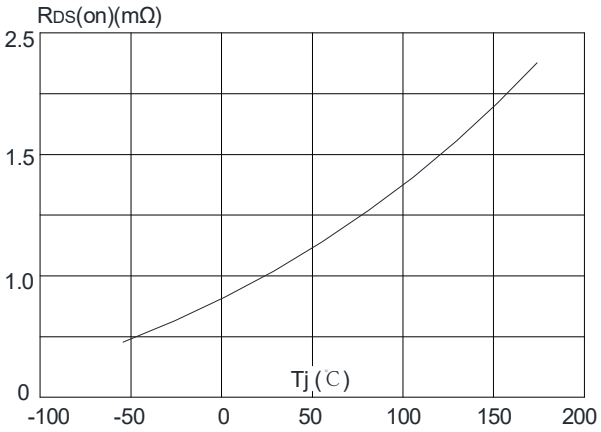


Figure 9: Maximum Safe Operating Area

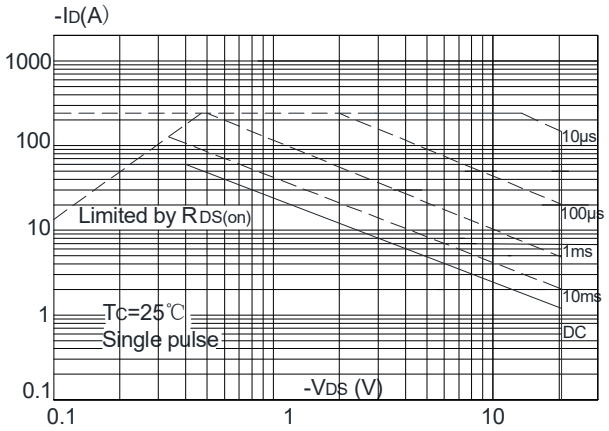


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

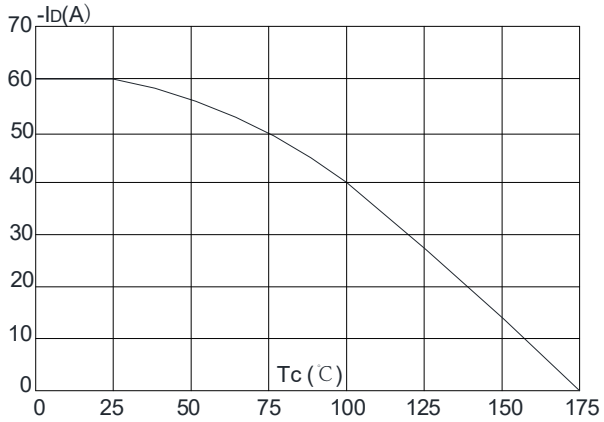
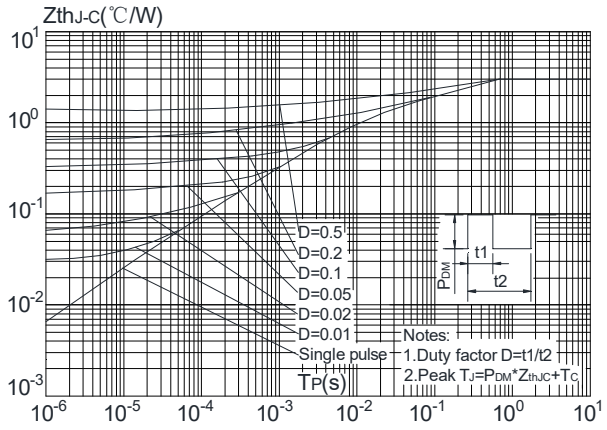
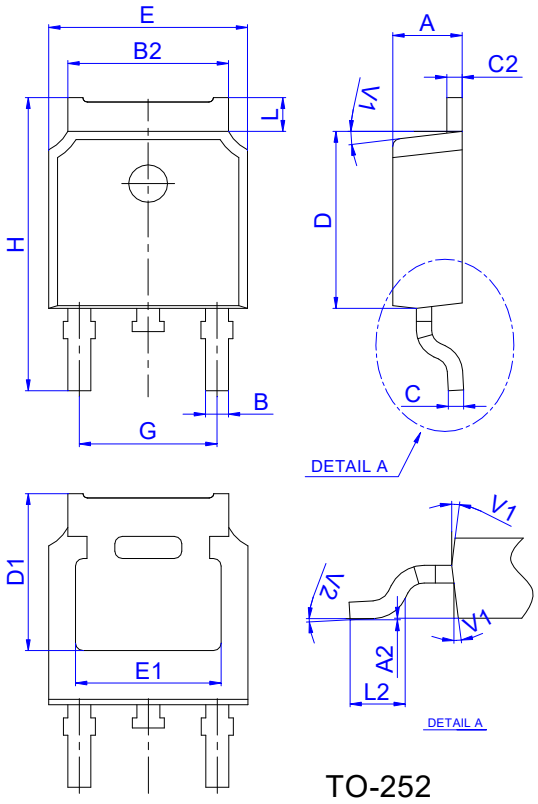


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



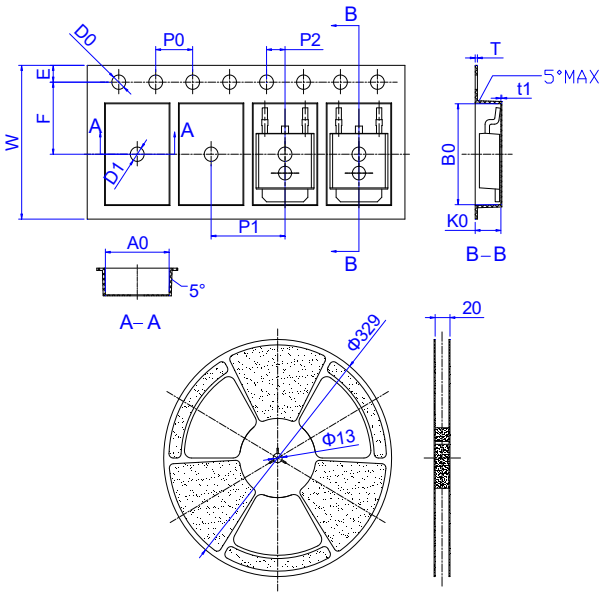
Test Circuit



TO-252

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°

Reel Specification-TO-252



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