MT8386M5

N-Channel Enhancement Mode Field Effect Transistor

MT Semiconductor®

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Product Summary

- V_{DS} = 30V
- I_D = 150A
- $R_{DS(ON)}$ = 2.3mΩ @V_{GS} = 10V
- $R_{DS(ON)}$ = 2.8mΩ@V_{GS} =4.5V

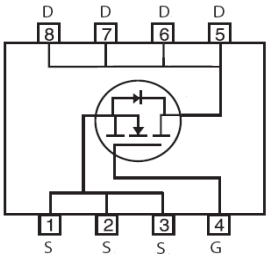
Features

- Advanced Trench Process Technology.
- High Density Cell Design for Ultra Low On-Resistance.
- Lead free product is acquired.
- RoHS Compliant.
- PDFN5x6-8L Package

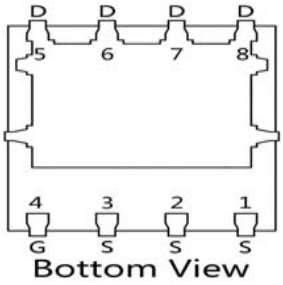
Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



Absolute Maximum Ratings (T_A = 25℃ unless otherwise noted)

Absolute Maximum Ratings T_A=25℃ unless otherwise noted				
Parameter		**Symbol**	**Maximum**	**Units**
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [G]	T_C=25℃	I_D	150	A
	T_C=100℃		95	
Pulsed Drain Current [C]		I_{DM}	300	
Avalanche Current [C]		I_{AS}, I_{AR}	40	A
Avalanche energy L=0.1mH [C]		E_{AS}, E_{AR}	80	mJ
Power Dissipation [B]	T_C=25℃	P_D	83	W
	T_C=100℃		33	
Power Dissipation [A]	T_A=25℃	P_{DSM}	2.5	W
	T_A=70℃		1.6	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	℃

Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	15	20	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		42	50	℃/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.1	1.5	℃/W

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	1.15	℃/W

Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=10mA, V_{GS}=0V	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V			0.5	mA
		T_J=125℃			100	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±12V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250μA	1.2	1.5	2	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V	240			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance[a]	V_{GS}=10V, I_D=20A		2.3	2.8	mΩ
		T_J=125℃		2.5		
		V_{GS}=4.5V, I_D=20A		2.8	3.8	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A		115		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.4		V
I_S	Maximum Body-Diode Continuous Current[G]				85	A
DYNAMIC PARAMETERS[b]						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		4830		pF
C_{oss}	Output Capacitance			490		pF
C_{rss}	Reverse Transfer Capacitance			280		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.3	0.7	1.0	Ω
SWITCHING PARAMETERS						
Q_g(4.5V)	Total Gate Charge	V_{GS}=10V, V_{DS}=15V, I_D=20A	24	31	38	nC
Q_{gs}	Gate Source Charge		8	11	14	nC
Q_{gd}	Gate Drain Charge		4	9	13	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=0.75Ω, R_{GEN}=3Ω		10		ns
t_r	Turn-On Rise Time			6		ns
$t_{D(off)}$	Turn-Off DelayTime			50		ns
t_f	Turn-Off Fall Time			7		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, dI/dt=500A/μs	9	12	15	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, dI/dt=500A/μs	17	22	27	nC

Note:

a. Pulse test; pulse width≦300μs, duty cycle≦2%.

b. Guaranteed by design, not subject to production testing.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

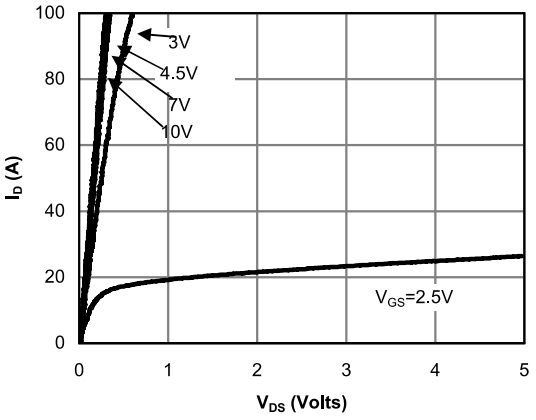


Fig 1: On-Region Characteristics (Note E)

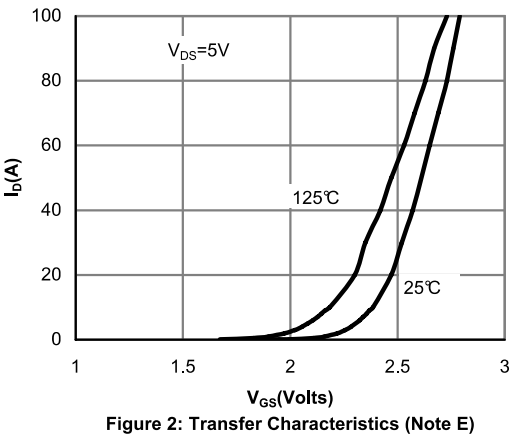


Figure 2: Transfer Characteristics (Note E)

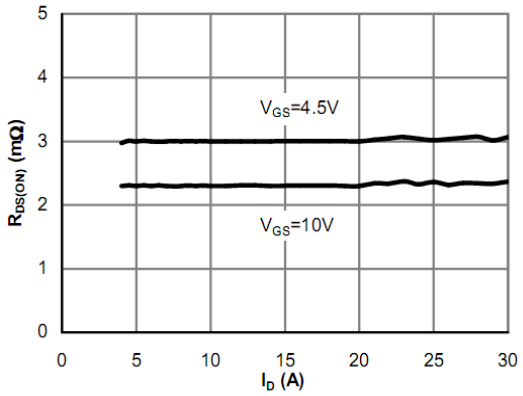


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

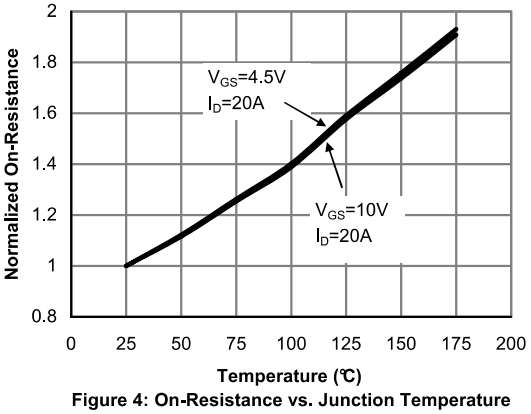


Figure 4: On-Resistance vs. Junction Temperature (Note E)

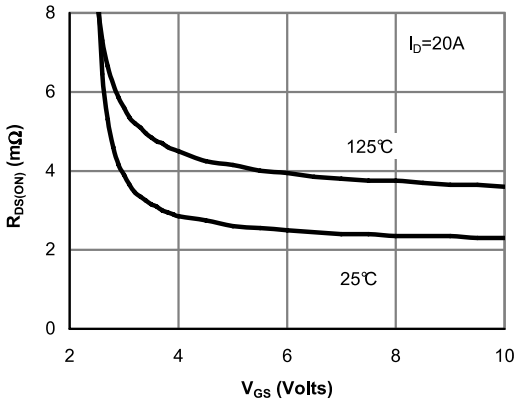


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

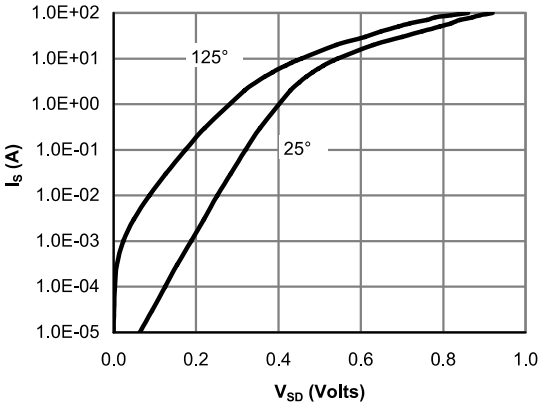


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

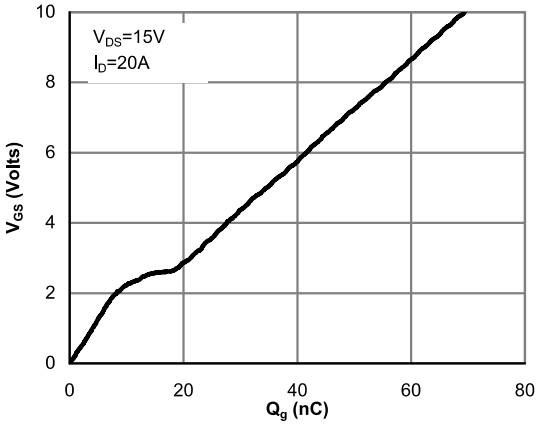


Figure 7: Gate-Charge Characteristics

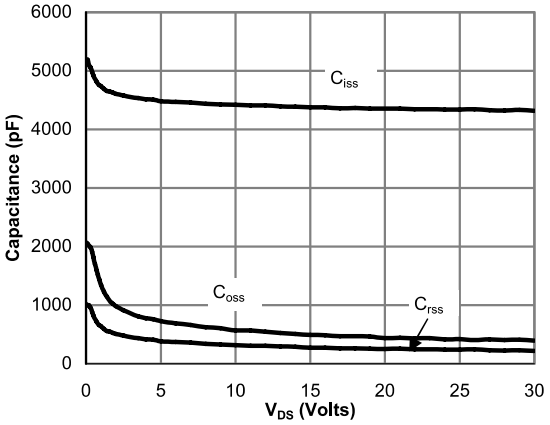


Figure 8: Capacitance Characteristics

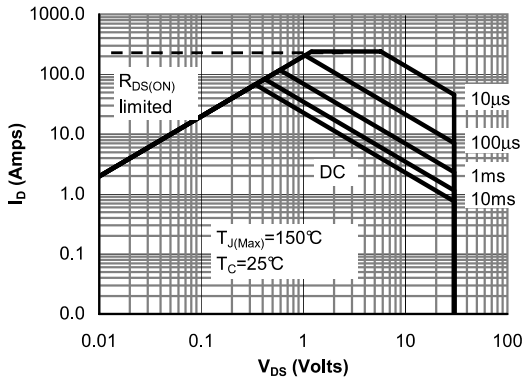


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

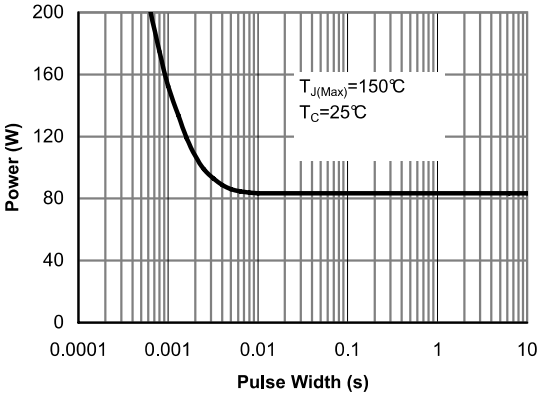


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

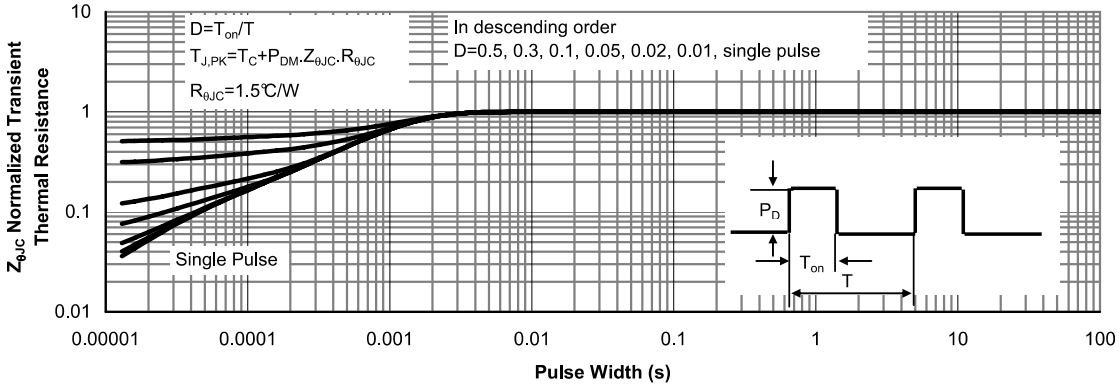


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

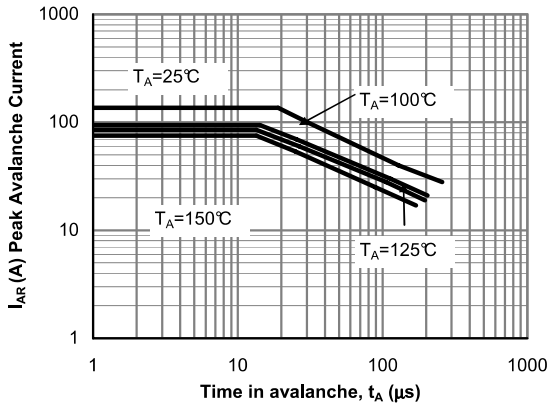


Figure 12: Single Pulse Avalanche capability (Note C)

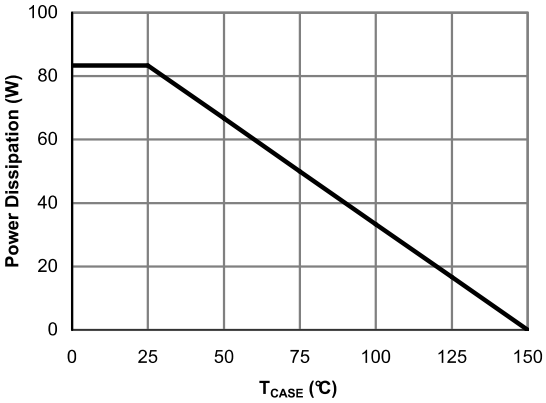


Figure 13: Power De-rating (Note F)

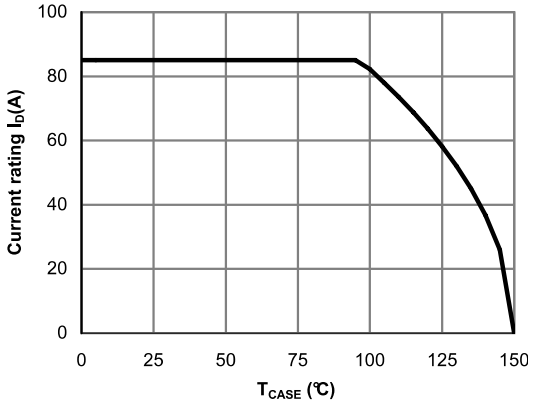


Figure 14: Current De-rating (Note F)

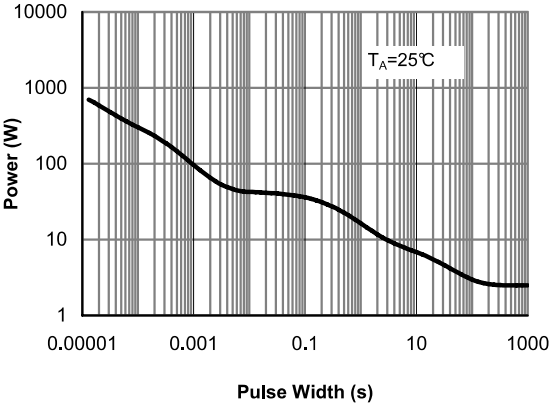


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

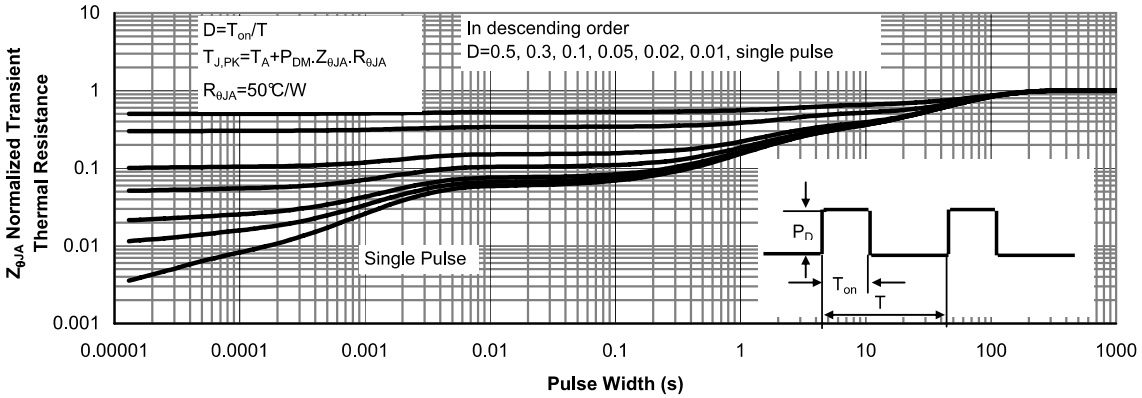


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

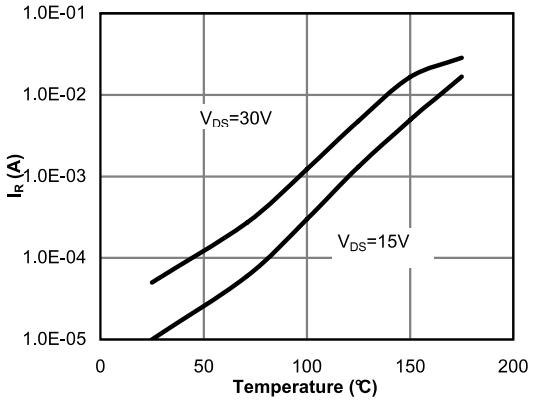


Figure 17: Diode Reverse Leakage Current vs. Junction Temperature

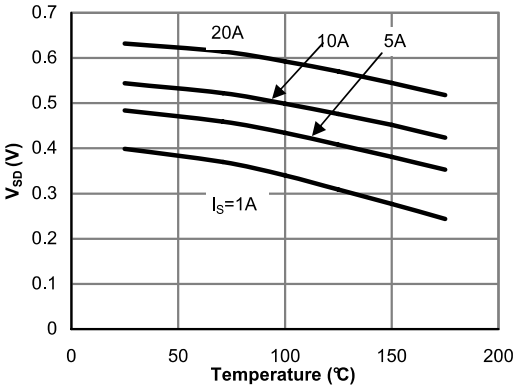


Figure 18: Diode Forward voltage vs. Junction Temperature

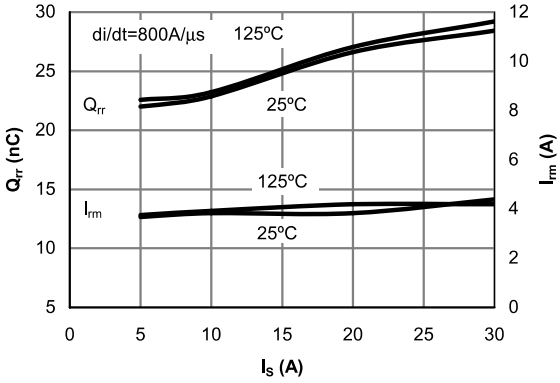


Figure 18: Diode Reverse Recovery Charge and Peak Current vs. Conduction Current

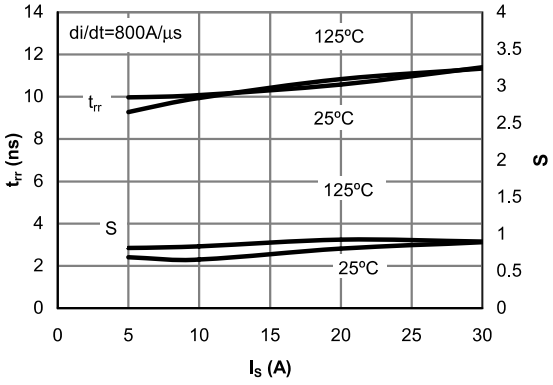


Figure 19: Diode Reverse Recovery Time and Softness Factor vs. Conduction Current

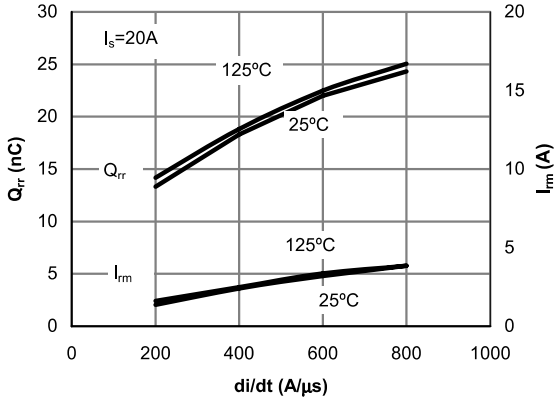


Figure 20: Diode Reverse Recovery Charge and Peak Current vs. di/dt

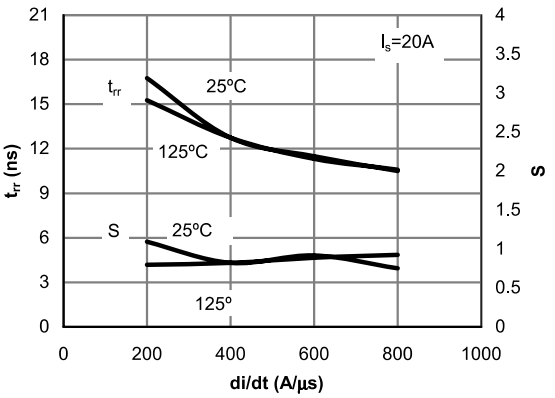
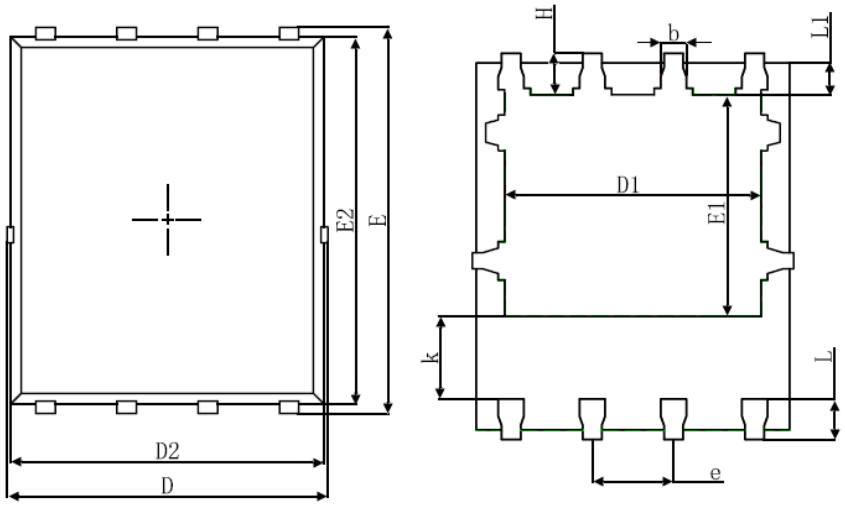


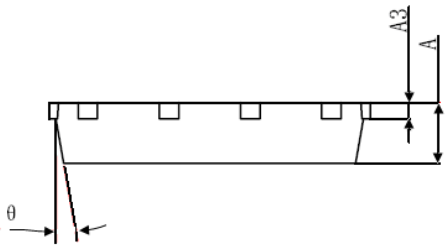
Figure 21: Diode Reverse Recovery Time and Softness Factor vs. di/dt

PDFN5X6-8L Package Information



Top View
[顶视图]

Bottom View
[背视图]



Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
K	1.190	1.390	0.047	0.055
b	0.035	0.450	0.014	0.018
e	1.270(TYP.)		0.050(TYP.)	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	8°	12°	8°	12°

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   3) 用于治疗(切除患部、给药等)的装置。
   4) 其他直接影响到人的生命的装置。
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Keep safety first in your circuit designs!

MOS-TECH Semiconductor Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.