ER3413A

-20V P-Channel MOSFET

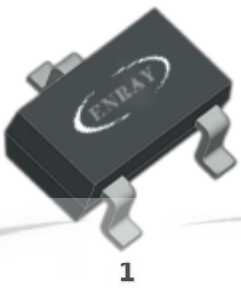
Features

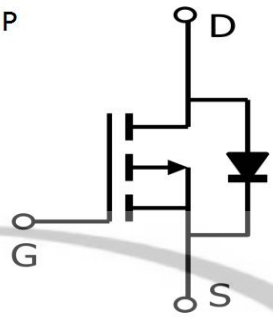
•Trench FET Power MOSFET
• High Speed Switching

Product Summary

V_{DS}	-20V
I_D	-3A
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 80mΩ
$R_{DS(ON)}$ (at V_{GS} =-2.5V)	< 100mΩ
$R_{DS(ON)}$ (at V_{GS} =-1.8V)	< 130mΩ

1.GATE
2.SOURCE
3.DRAIN





Order Information

Product	Package	Marking	Packing
ER3413A	SOT-23-3L	A39T	3000PCS/Reel

Maximum Ratings(Ta=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±8	
Continuous Drain Current	I_D	-3	A
Pulsed Drain Current ①	I_{DM}	-15	
Continuous Source-Drain Current(Diode Conduction)	I_S	-1.4	
Power Dissipation ②	P_D	1.4	W
Thermal Resistance from Junction to Ambient (t≤5s)	$R_{\theta JA}$	125	℃/W
Operating Junction	T_J	150	℃
Storage Temperature	T_{STG}	-55~+150	℃

Electrical Characteristics(TJ=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters ③						
Drain-Source Breakdown Voltage	BV_{DSS}	VGS = 0V, ID = -250μA	-20			V
Gate Threshold Voltage	$V_{GS(th)}$	VDS =VGS, ID = -250μA	-0.4		-1.1	V
Gate-Body leakage Current	I_{GSS}	VDS =0V, VGS = ±8V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	VDS = -20V, VGS =0V			-1	μA
Static Drain-Source On-Resistance	$R_{DS(on)}$	VGS = -4.5V, ID = -3A		56	80	mΩ
		VGS = -2.5V, ID = -2.5A		70	100	mΩ
		VGS = -1.8V, ID =- 1A		85	130	mΩ
Forward Transconductance	gFs	VDS = -5V, ID = - 3A		12		S
Diode Forward Voltage	V_{SD}	IS= -1A,VGS=0V		-0.8	-1	V
Dynamic Parameters ④						
Input Capacitance	C_{iss}	VDS = -10V, VGS =0V, f=1MHz		560		pF
Output Capacitance	C_{oss}			80		pF
Reverse Transfer Capacitance	C_{rss}			70		pF
Total Gate Charge	Q_g	VDS = -10V, VGS = -4.5V, ID = -3A		8.5		nC
Gate Source Charge	Q_{gs}			1.2		nC
Gate Drain Charge	Q_{gd}			2.1		nC
Gate Resistance	Rg	f=1MHz		15		Ω
Switching Parameters ④						
Turn-On DelayTime	$t_{d(on)}$	VDS= -10V RL= 2.7Ω, ID = -3A, VGS= - 4.5V,Rg= 6Ω		7.2		ns
Turn-On Rise Time	tr			36		ns
Turn-Off DelayTime	$t_{d(off)}$			53		ns
Turn-Off Fall Time	tf			56		ns

Note :

1. Repetitive Rating : Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t < 5 sec.
3. Pulse Test : Pulse Width≤300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing.

Typical Electrical and Thermal Characteristics

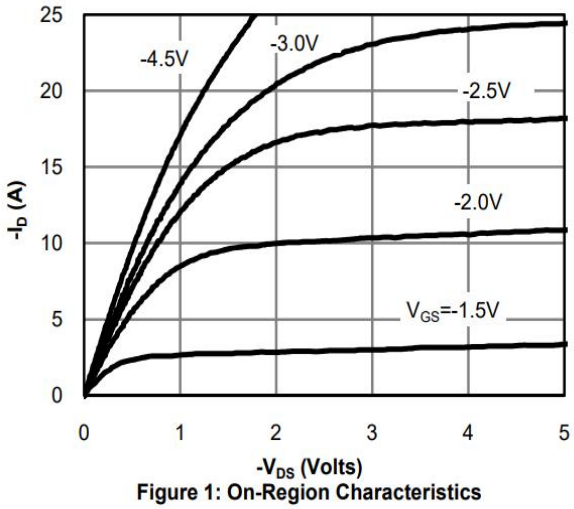


Figure 1: On-Region Characteristics

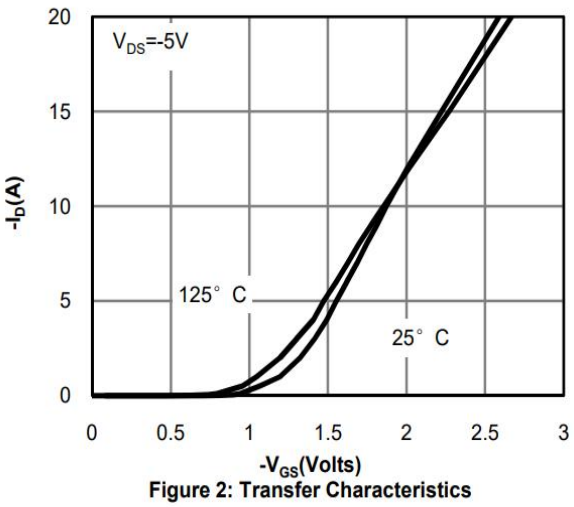


Figure 2: Transfer Characteristics

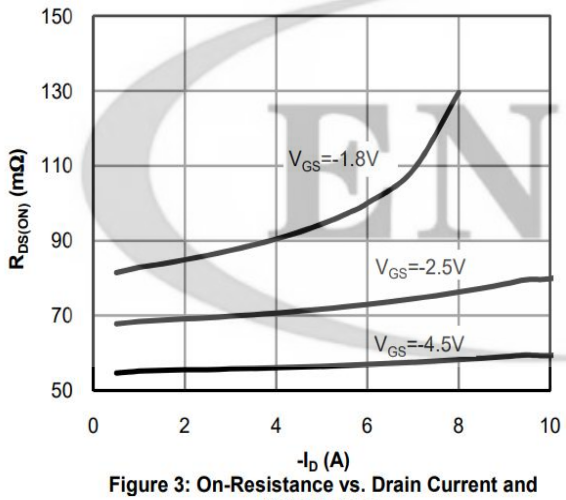


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

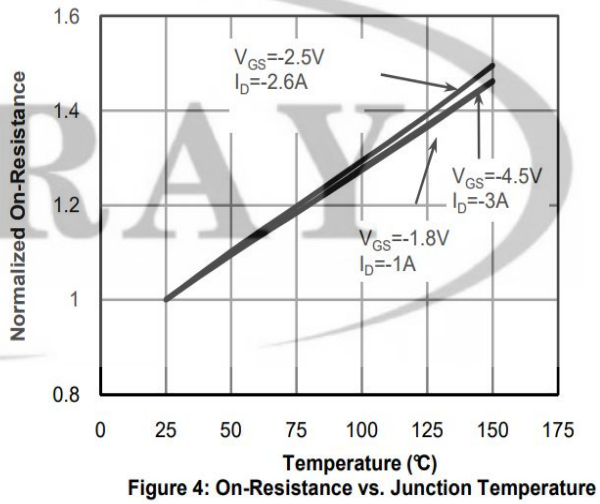


Figure 4: On-Resistance vs. Junction Temperature

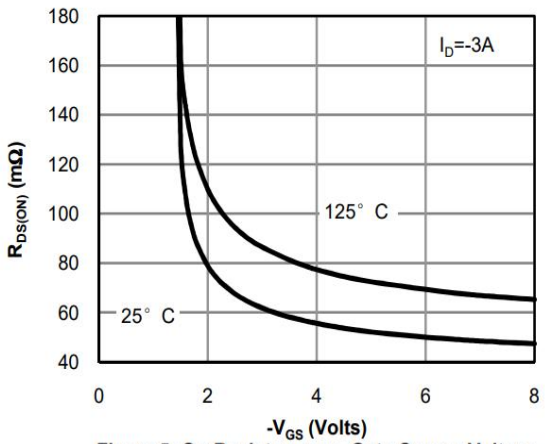


Figure 5: On-Resistance vs. Gate-Source Voltage

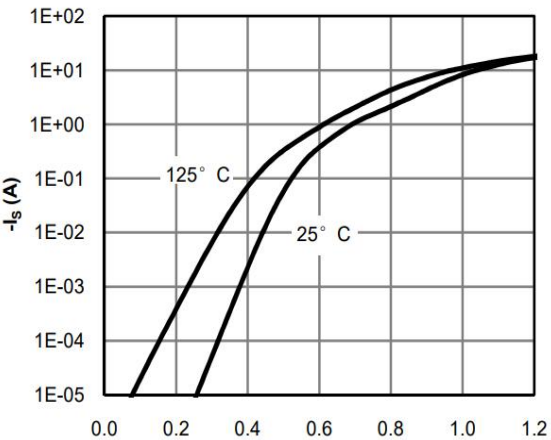


Figure 6: Body-Diode Characteristics

Typical Electrical and Thermal Characteristics

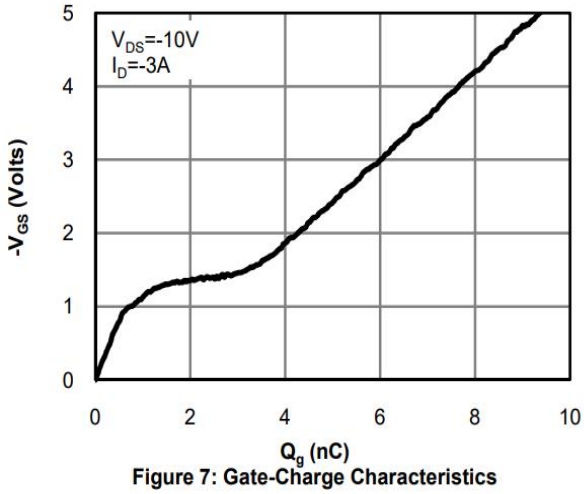


Figure 7: Gate-Charge Characteristics

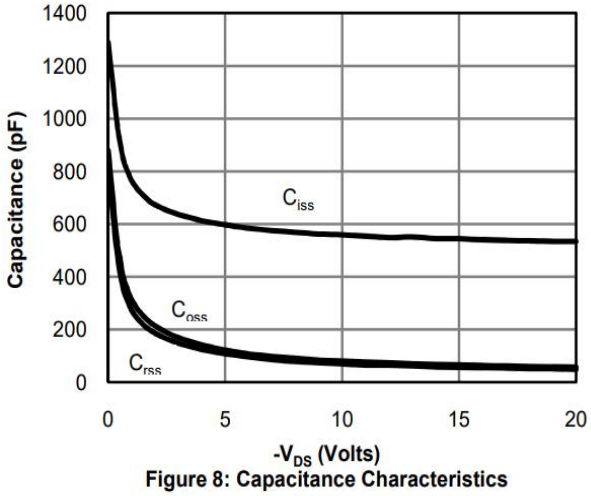


Figure 8: Capacitance Characteristics

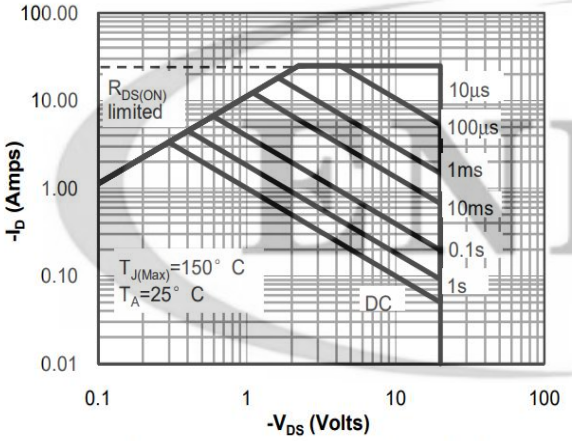


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

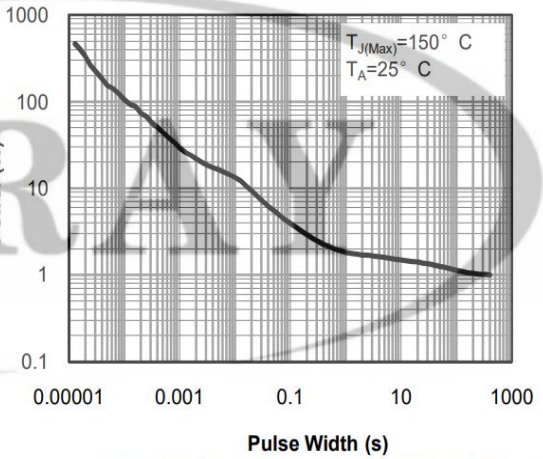


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

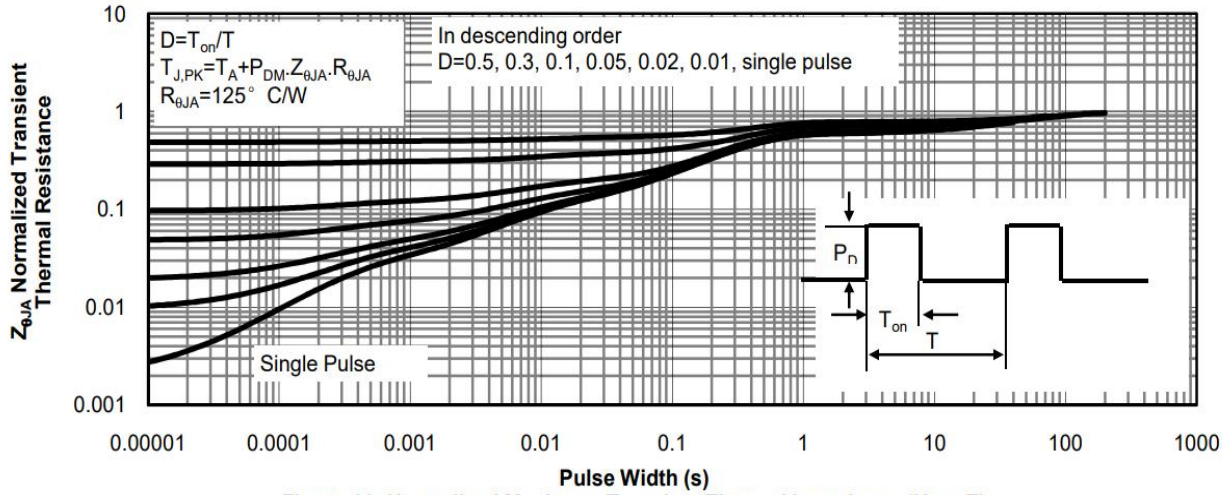
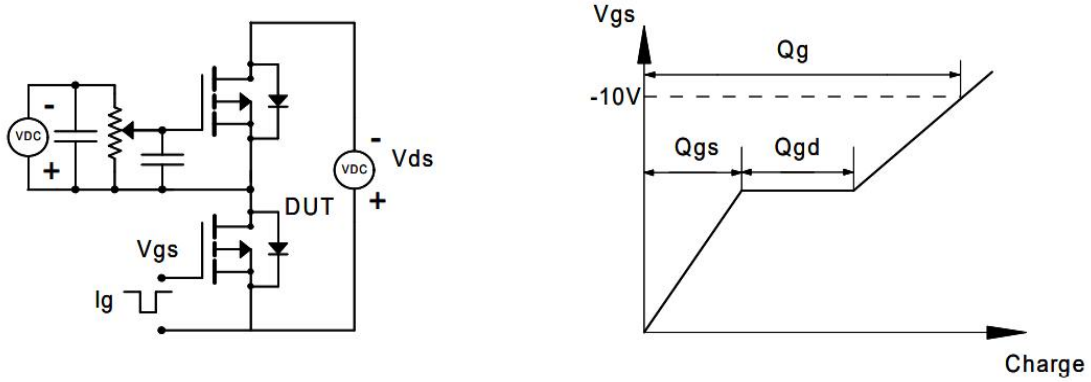


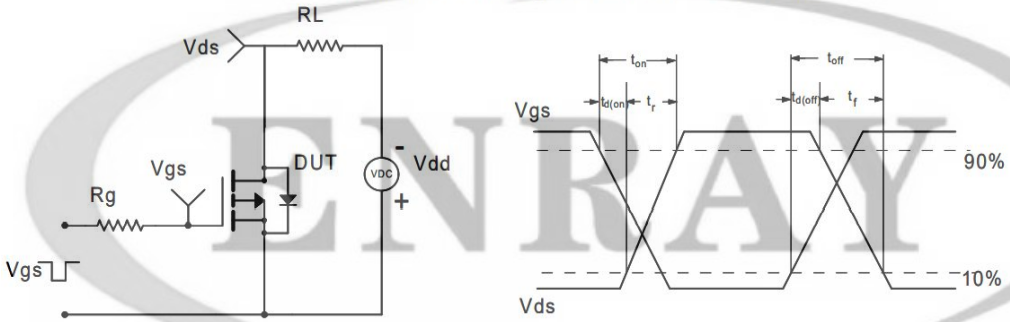
Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

Typical Electrical and Thermal Characteristics

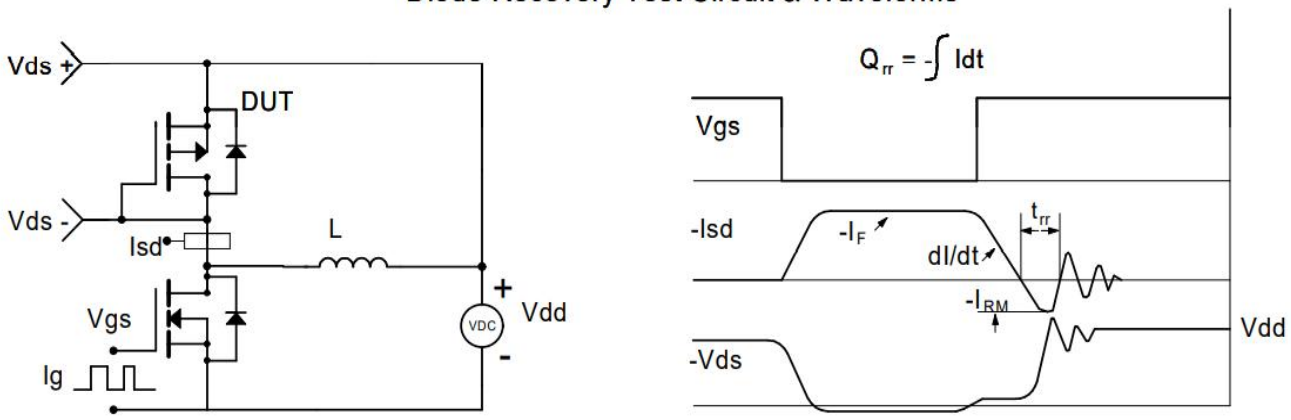
Gate Charge Test Circuit & Waveform



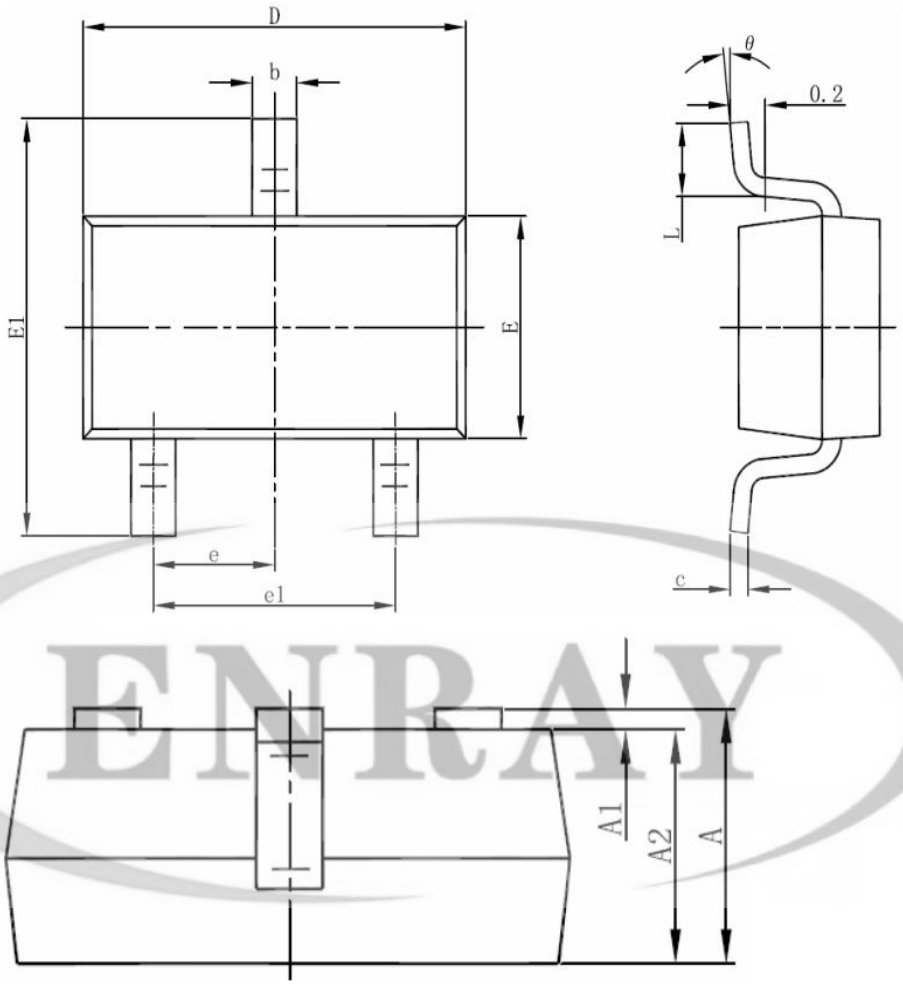
Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



SOT-23-3L Package Outline Dimesions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037 (BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°