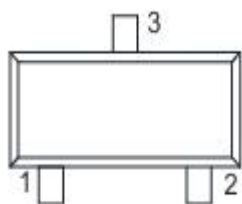


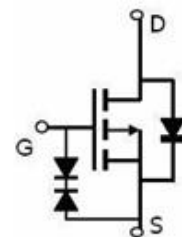
Features <ul style="list-style-type: none"> ➤ Super Low Gate Charge ➤ Green Device Available ➤ Excellent Cdv/dt effect decline ➤ Advanced high cell density Trench technology ➤ ESDRating:2500V HBM 	Bvdss	Rdson	ID
	-20V	29mΩ	-5A
Application <ul style="list-style-type: none"> ➤ Battery protection ➤ Load Switch ➤ Uninterruptible power supply 			

Package


1. Marking and pin assignment



2. SOT23 top view



3. Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
3415E	3415E	SOT23	3000

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

Parameter	Symbol	Rating		Unit
		10s	SteadyState	
Drain-Source Voltage	V_{DS}	-20		V
Gate-Source Voltage	V_{GS}	± 10		V
Continuous Drain Current, $V_{GS} @ -4.5V$ (1)	$I_{D@T_A=25^{\circ}\text{C}}$	-5	-4	A
Continuous Drain Current, $V_{GS} @ -4.5V$ (1)	$I_{D@T_A=70^{\circ}\text{C}}$	-4	-3.7	A
Pulsed Drain Current(2)	I_{DM}	-18		A
Total Power Dissipation	$P_D@T_A=25^{\circ}\text{C}$	1.32	1	W
Storage Temperature Range	T_{STG}	-55 to 150		$^{\circ}\text{C}$
Operating Junction Temperature Range	T_J	-55 to 150		$^{\circ}\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-ambient(1)	$R_{\theta JA}$	125	$^{\circ}\text{C}/\text{W}$
Thermal Resistance Junction-ambient(1) ($t \leq 10s$)	$R_{\theta JA}$	95	$^{\circ}\text{C}/\text{W}$
Thermal Resistance Junction-Case(1)	$R_{\theta JC}$	80	$^{\circ}\text{C}/\text{W}$



Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free		G	S	D	
HL3415E	SOT23	1	2	3	Tape Reel

Electrical Characteristics ($T_j=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-20V, V_{GS}=0V,$	-	-	-1.0	μA
Gate to Body Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 10V$	-	-	± 10	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.7	-1.0	V
Static Drain to Source On-State Resistance(2)	$R_{ds(on)}$	$V_{GS}=-4.5V, I_D=-4A$	-	29	40	m Ω
		$V_{GS}=-2.5V, I_D=-3A$	-	40	56	
Input Capacitance	C_{iss}	$V_{DS}=-10V, V_{GS}=0V,$ $f=1.0MHz$	-	289	-	pF
Output Capacitance	C_{oss}		-	98	-	pF
Reverse Transfer Capacitance	C_{rss}		-	22	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD}=-10V, R_{GEN}=1\Omega,$ $R_L=1.2\Omega, V_{GEN}=-4.5V$	-	12	-	ns
Rise Time	t_r		-	35	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	30	-	ns
Fall Time	t_f		-	10	-	ns
Total Gate Charge	Q_g	$V_{DS}=-10V, I_D=-4.1A,$ $V_{GS}=-4.5V$	-	9	-	nC
	Q_{gs}		-	1	-	nC
	Q_{gd}		-	2.6	-	nC
Continuous Diode Forward Current	I_S		-	-	-4.1	A
Continuous Diode Pulse Current	I_{sm}		-	-	-16.4	A
Drain to Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-4.1A$	-	-	-1.2	V

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Pulse Test: Pulse Width $\leq 300 \mu s$, Duty Cycle $\leq 0.5\%$

Typical Characteristics

Figure 1: Output Characteristics

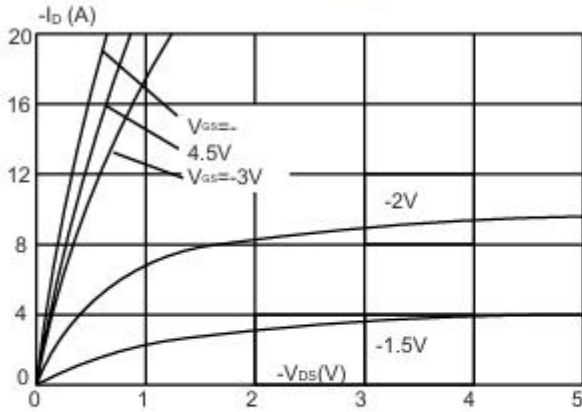


Figure 2: Typical Transfer Characteristics

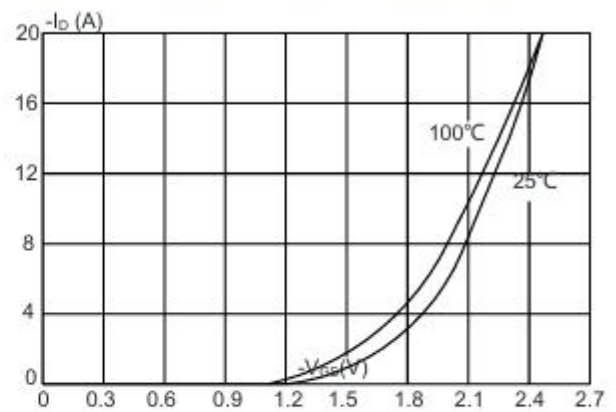


Figure 3: On-resistance vs. Drain Current

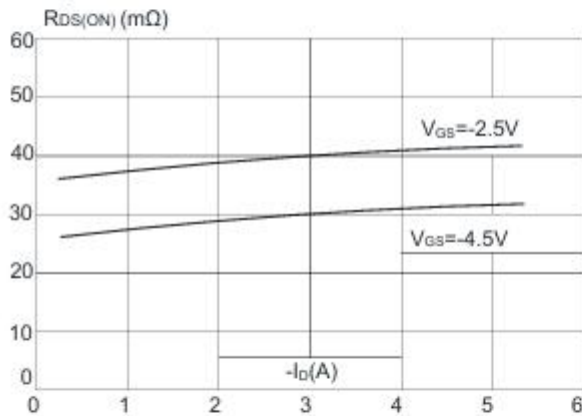


Figure 4: Body Diode Characteristics

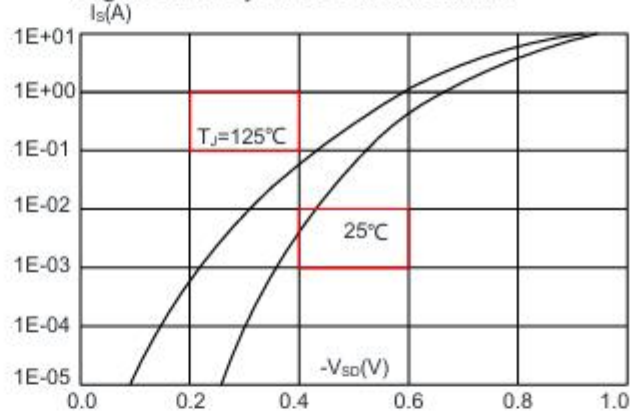


Figure 5: Gate Charge Characteristics

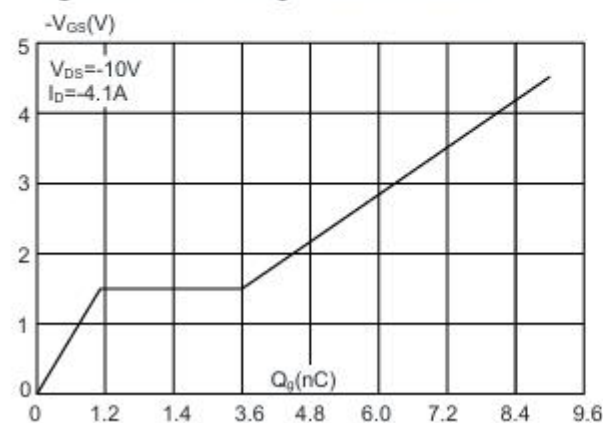
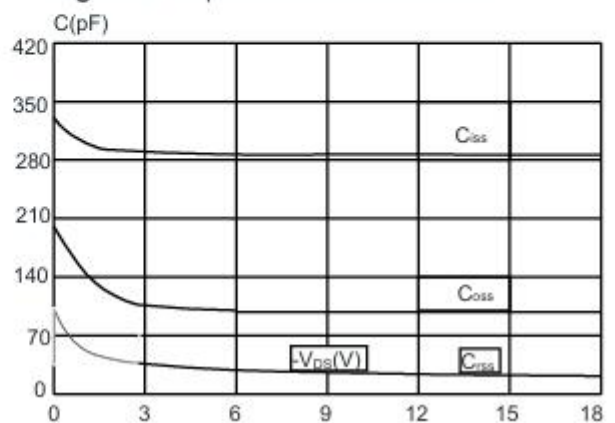


Figure 6: Capacitance Characteristics



Typical Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

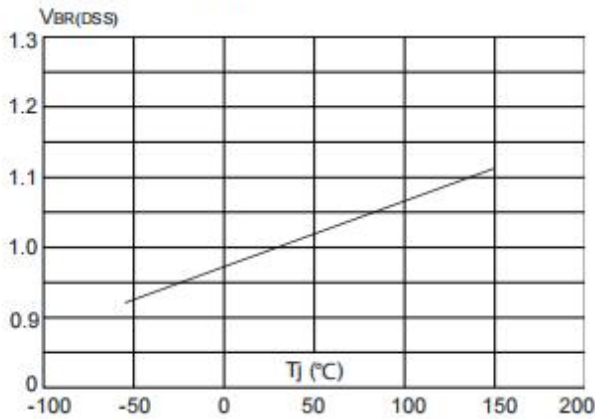


Figure 8: Normalized on Resistance vs. Junction Temperature

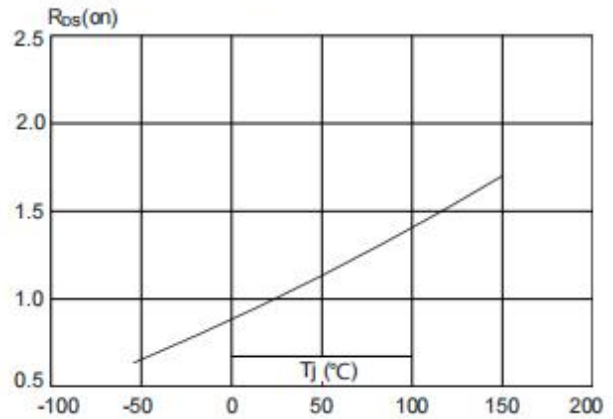


Figure 9: Maximum Safe Operating Area

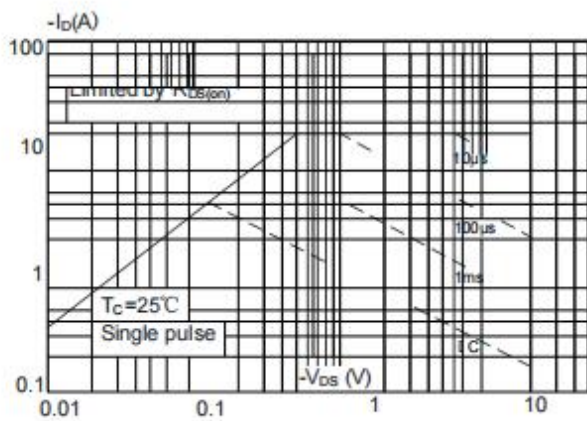


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

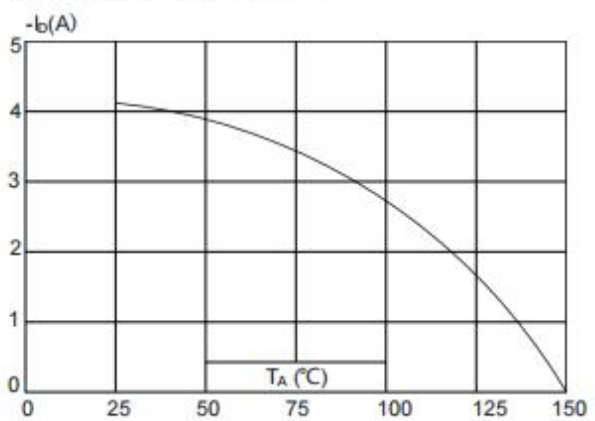
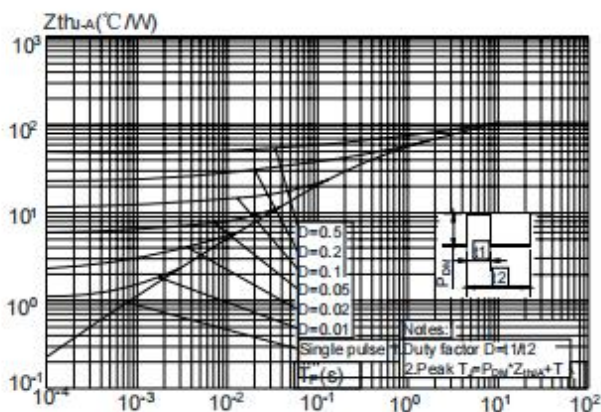
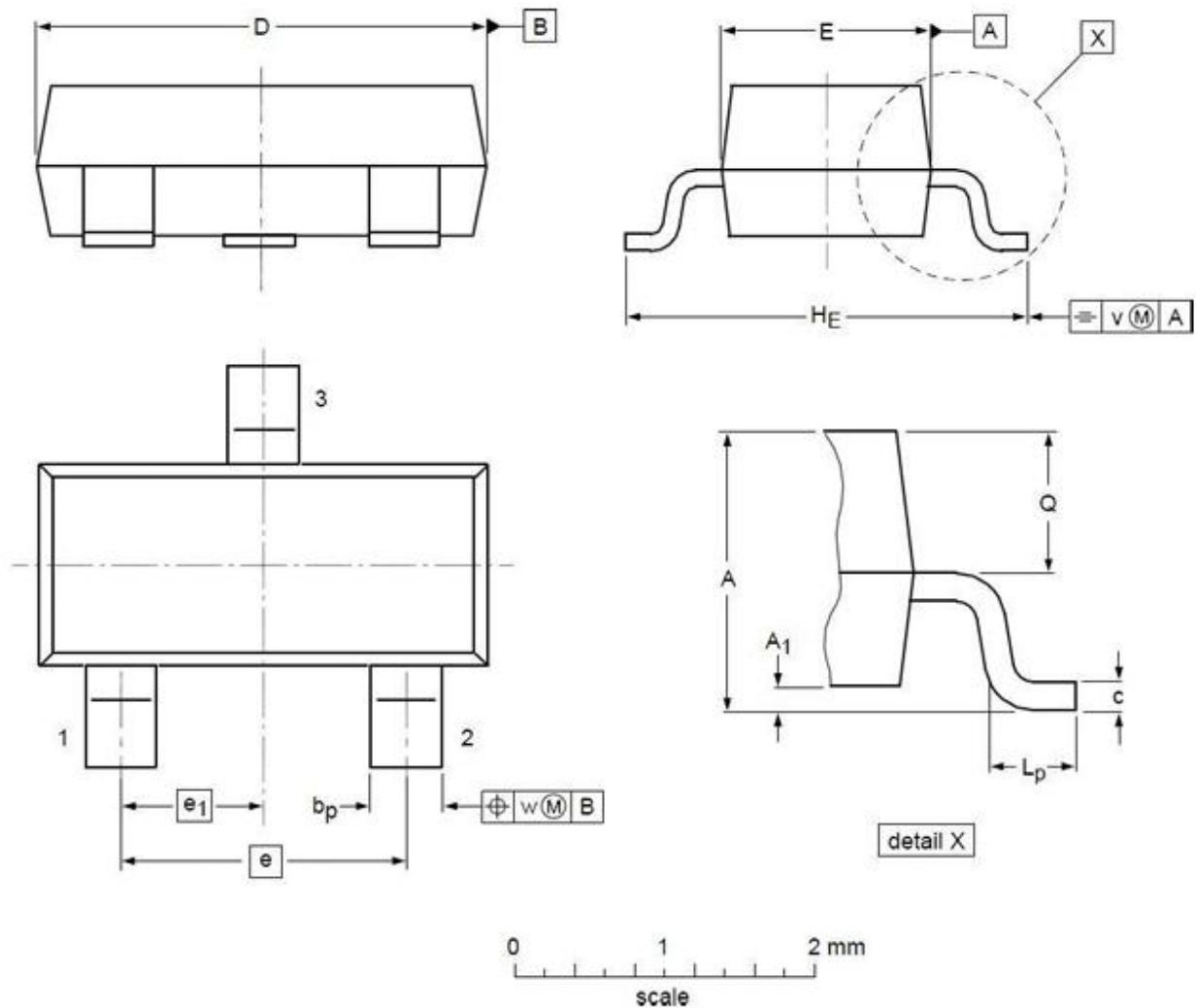


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Package Dimensions

➤ SOT23



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.01	1.15	A ₁	0.01	0.05	0.10
b _p	0.30	0.42	0.50	c	0.08	0.13	0.15
D	2.80	2.92	3.00	E	1.20	1.33	1.40
e	--	1.90	--	e ₁	--	0.95	--
H _E	2.25	2.40	2.55	L _p	0.30	0.42	0.50
Q	0.45	0.49	0.55	v	--	0.20	--
w	--	0.10	--				



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