Feb 2015

SemiHow
Know-How for Semiconductor

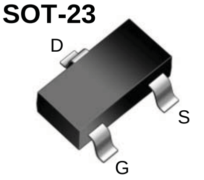
HRLE550P03K
-30V P-Channel MOSFET

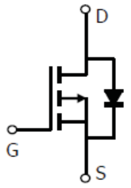
BV_{DSS} = - 30 V

$R_{DS(on)max}$ = 55 mΩ

I_D = - 4 A

SOT-23





FEATURES

- Super High Dense Cell Design
- Reliable and Rugged
- Lower $R_{DS(ON)}$: 55 mΩ (Max.) @V_{GS}=-10V
- Lower $R_{DS(ON)}$: 65 mΩ (Max.) @V_{GS}=-4.5V
- Lower $R_{DS(ON)}$: 100 mΩ (Max.) @V_{GS}=-2.5V
- 100% Avalanche Tested

Absolute Maximum Ratings

T_A=25℃ unless otherwise specified

Symbol	Parameter		Value	Units
V_{DSS}	Drain-Source Voltage		-30	V
V_{GS}	Gate-Source Voltage		±12	V
I_D	Drain Current	T_A = 25℃	-4	A
		T_A = 70℃	-3.1	A
I_{DM}	Pulsed Drain Current		-12	A
P_D	Power Dissipation	T_A = 25℃	1.4	W
		T_A = 100℃	0.6	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient	--	95	℃/W

Electrical Characteristics T_A=25 °C unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{GS}	Gate Threshold Voltage	$V_{DS} = V_{GS}$, I_D = -250 µA	-1.0	--	-2.5	V
$R_{DS(ON)}$[1]	Static Drain-Source On-Resistance	V_{GS} = -10 V, I_D = -4 A	--	45	55	mΩ
		V_{GS} = -4.5 V, I_D = -3 A	--	57	65	mΩ
		V_{GS} = -2.5 V, I_D = -2 A	--	80	100	mΩ

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = -250 µA	-30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -24 V, V_{GS} = 0 V	--	--	-1	µA
		V_{DS} = -24 V, T_J = 70℃	--	--	-10	µA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±12 V, V_{DS} = 0 V	--	--	±100	nA

Dynamic Characteristics [2]

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = -10 V, V_{GS} = 0 V, f = 1.0 MHz	--	885	--	pF
C_{oss}	Output Capacitance		--	75	--	pF
C_{rss}	Reverse Transfer Capacitance		--	65	--	pF
R_g	Gate Resistance	V_{GS} = 0 V, V_{DS} = 0 V, f = 1MHz	--	6	--	Ω

Switching Characteristics [2]

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-On Time	V_{DS} = -15 V, I_D = -1 A, R_G = 6 Ω	--	5.5	--	ns
t_r	Turn-On Rise Time		--	12	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	58	--	ns
t_f	Turn-Off Fall Time		--	28	--	ns
Q_g	Total Gate Charge	V_{DS} = -15 V, I_D = -4 A, V_{GS} = -10 V	--	18	--	nC
Q_{gs}	Gate-Source Charge		--	1.5	--	nC
Q_{gd}	Gate-Drain Charge		--	2.9	--	nC

Source-Drain Diode Maximum Ratings and Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I_S	Continuous Source-Drain Diode Forward Current		--	-1	--	A
V_{SD}[1]	Source-Drain Diode Forward Voltage	I_S = -1 A, V_{GS} = 0 V	--	--	-1.1	V
trr	Reverse Recovery Time	I_S = -4 A, V_{GS} = 0 V di_F/dt = 100 A/µs	--	13	--	ns
Qrr	Reverse Recovery Charge		--	7	--	nC

Notes ;

1. Pulse test : pulse width ≤ 300ns, duty cycle ≤ 2%
2. Guaranteed by design, not subject to production testing

Typical Characteristics

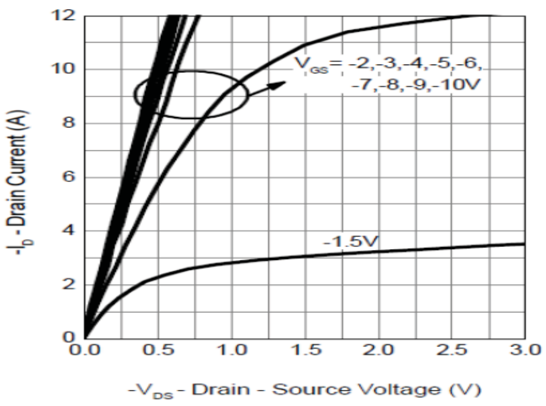


Figure 1. On Region Characteristics

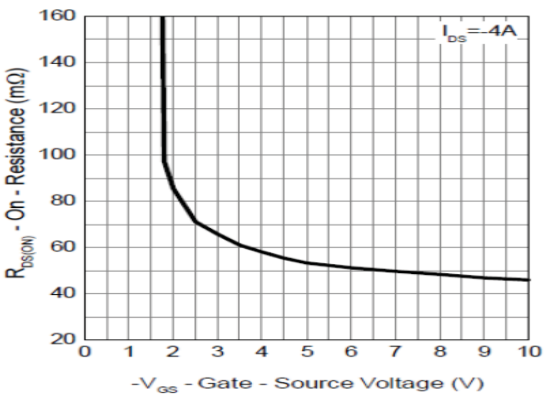


Figure 2. Gate-Source On Resistance

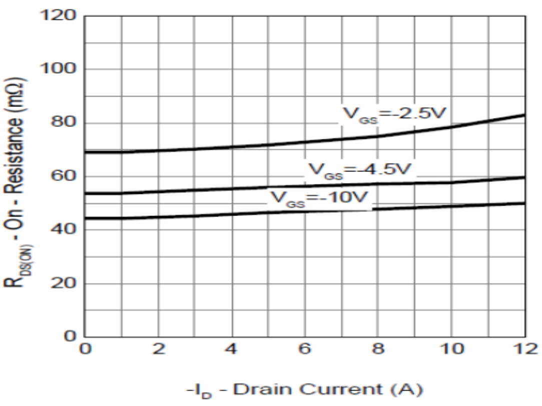


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

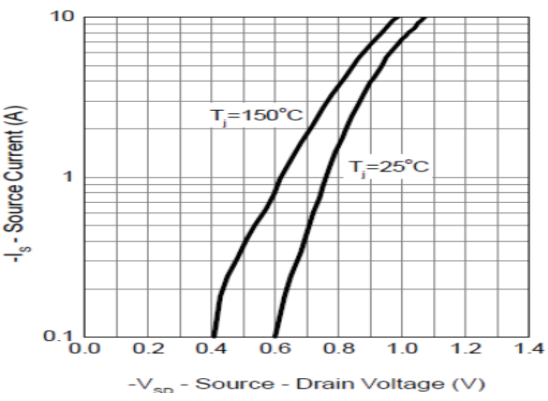


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

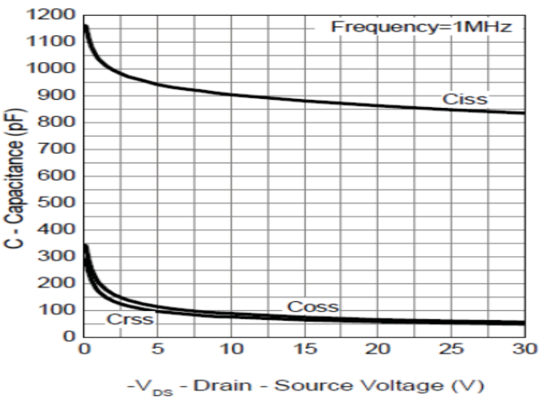


Figure 5. Capacitance Characteristics

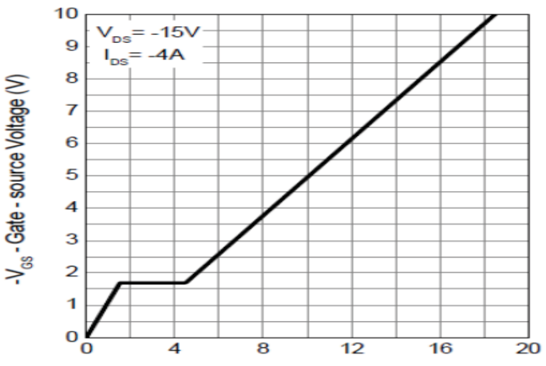


Figure 6. Gate Charge Characteristics

Typical Characteristics (continued)

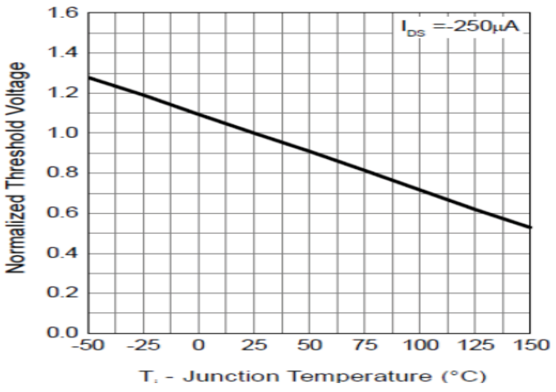


Figure 7. Gate Threshold Voltage vs Temperature

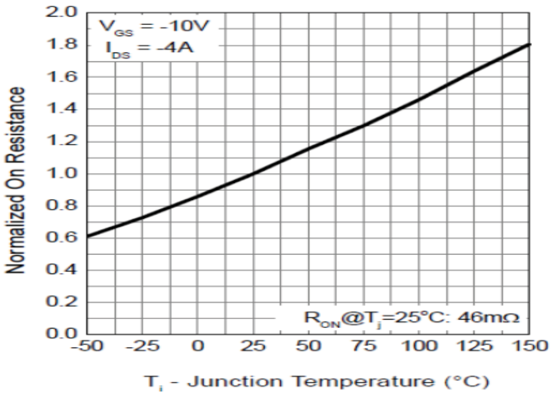


Figure 8. On-Resistance Variation vs Temperature

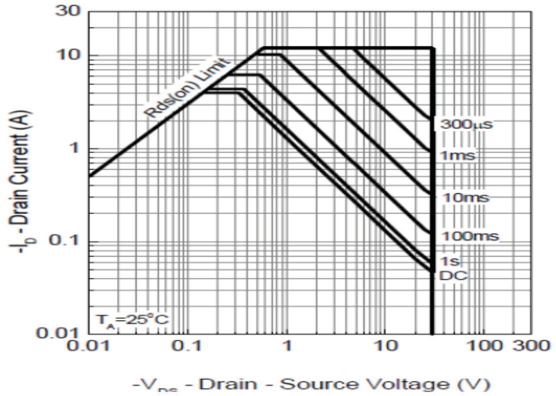


Figure 9. Maximum Safe Operating Area

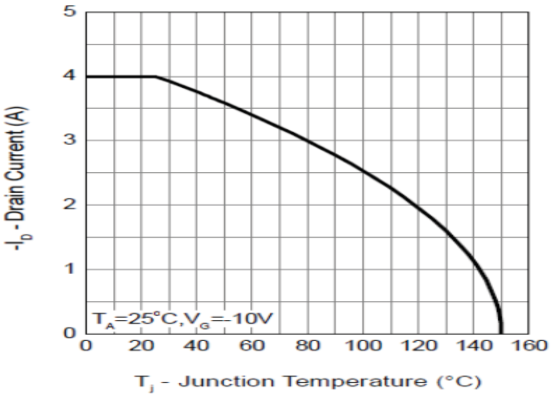


Figure 10. Maximum Drain Current vs Case Temperature

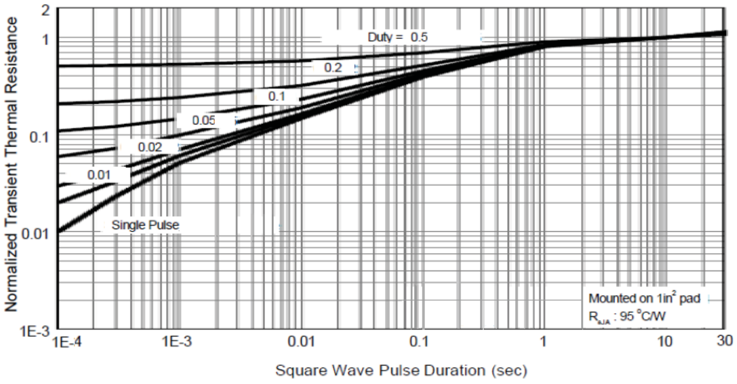


Figure 11. Transient Thermal Response Curve

Fig 12. Gate Charge Test Circuit & Waveform

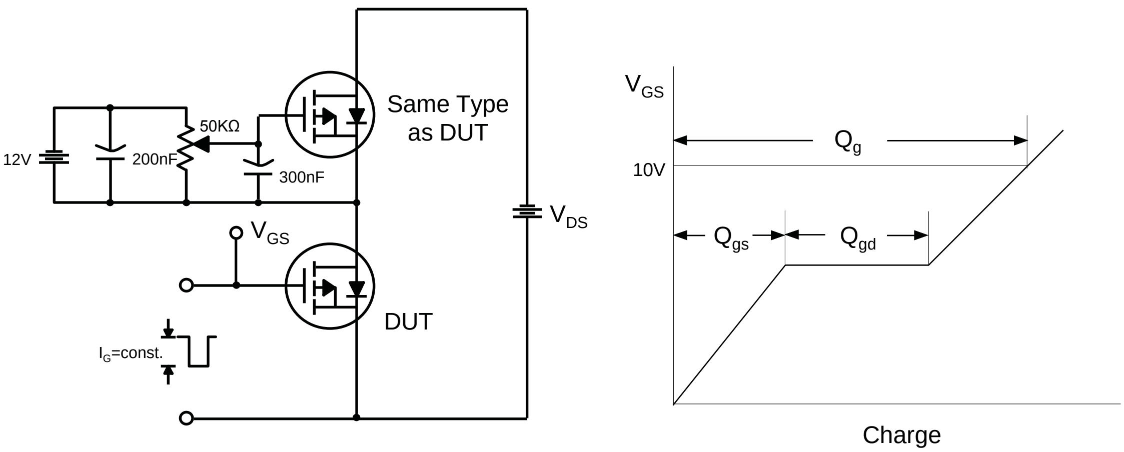


Fig 13. Resistive Switching Test Circuit & Waveforms

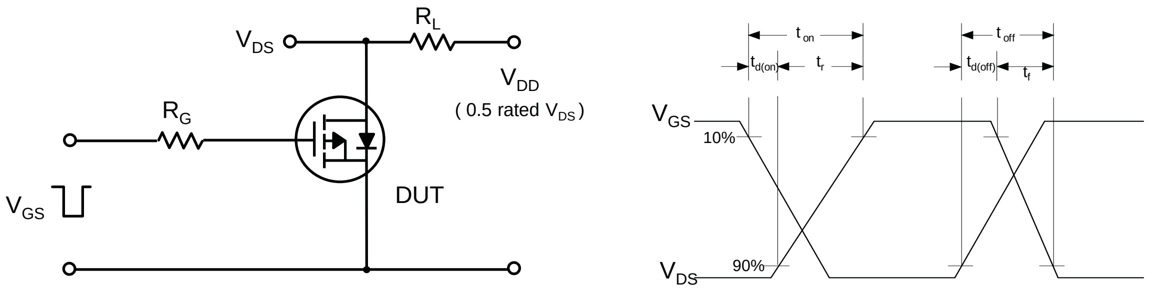


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

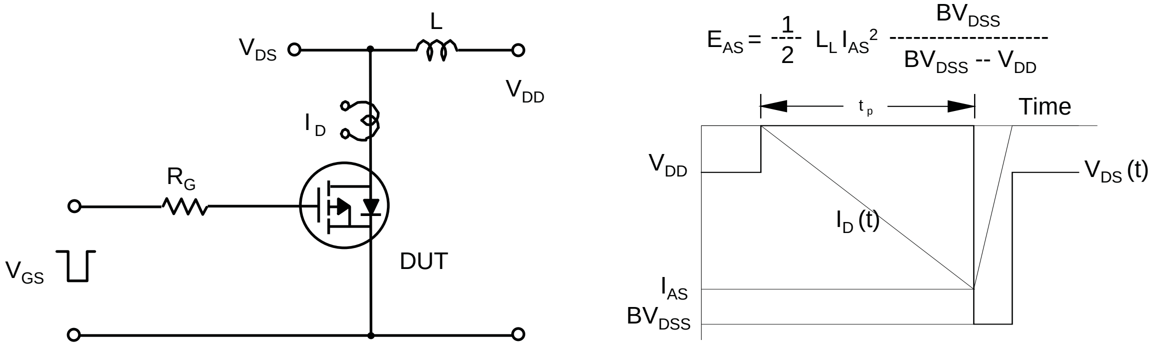
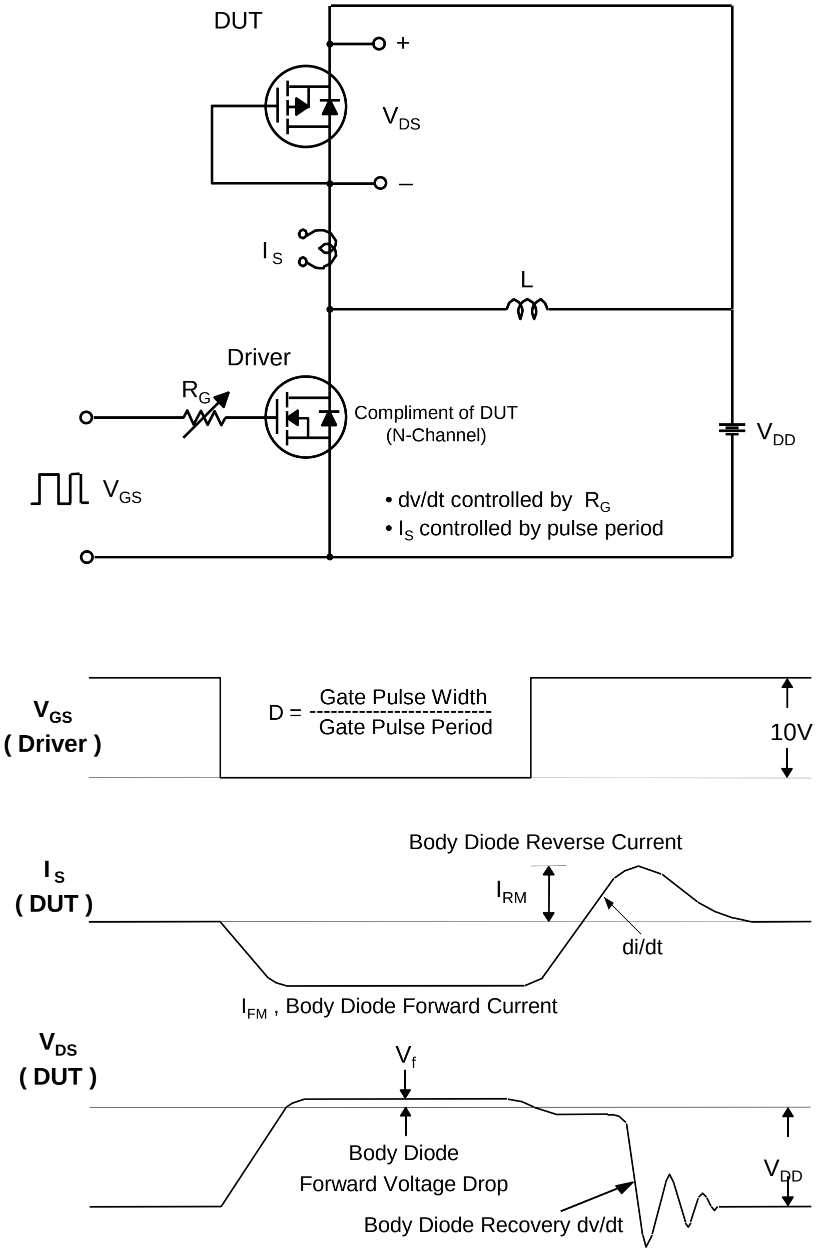


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimension & Marking Information

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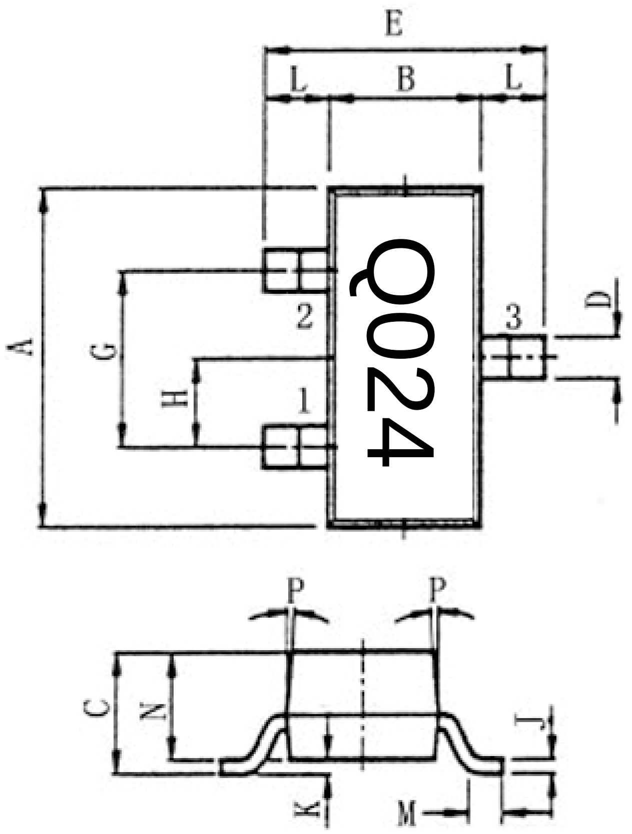

A	2. 90±0. 20
B	1. 30+0. 20/−0. 15
C	1. 30MAX
D	0. 40+0. 15/−0. 05
E	2. 40+0. 30/−0. 20
G	1. 90±0. 2
H	0. 95±0. 1
J	0. 10+0. 10/−0. 05
K	0. 00~0. 10
L	0. 55±0. 1
M	0. 20MIN
N	1. 00+0. 20/−0. 10
P	7°