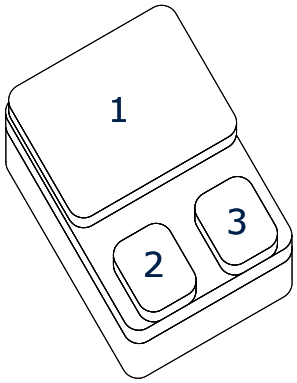
HiRel RadHard Power-MOS



- Low $R_{DS(on)}$
- Single Event Effect (SEE) hardened
  LET 73, Range: 253µm (Xe) LET 55, Range: 95µm (Xe)
  V_{GS} = -10V, V_{DS} = 150V V_{GS} = -15V, V_{DS} = 150V
  V_{GS} = -15V, V_{DS} = 80V V_{GS} = -20V, V_{DS} = 100V
- Total Ionisation Dose (TID) hardened
  100 kRad approved (Level R)
- Hermetically sealed
- N-channel
- esa **Space Qualified**
  ESA/SCC Detail Spec. No.: 5205/031
  Type Variant No. 02

Type	Marking	Pin Configuration 1	2	3	-	Package
BUY15CS57A-01	-	D	G	S	-	SMD2

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain Source Voltage	V_{DS}	150	V
Gate Source Voltage	V_{GS}	+/- 20	V
Drain Gate Voltage	V_{DG}	150	V
Continuous Drain Current T_C = 25 °C T_C = 100 °C	I_D	 57 [2] 45 [2]	A
Continuous Source Current	I_S	57	A
Drain Current Pulsed, t_p limited by T_{jmax}	I_{DM}	224	Apk
Total Power Dissipation [1]	P_{tot}	250	W
Operating and Storage Temperature	T_{op}	-55 to + 150	°C
Avalanche Energy	E_{AS}	520	mJ

Thermal Characteristics

Thermal Resistance (Junction to Case)	$R_{th\ JC}$	0.5	K/W
Soldering Temperature	T_{sol}	250	°C

Notes.:

1) For $T_S \leq 25°C$. For $T_S > 25°C$ derating is required.

2) limited by package.

Electrical Characteristics, at T_A=25°C; unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Breakdown Voltage Drain to Source I_D = 0.25mA, V_{GS} = 0V	BV_{DSS}	150	-	-	V
Temperature Coefficient of B_{VDSS}	$\Delta BV_{DSS}/\Delta T_J$	-	0.20	-	V/°C
Gate Threshold Voltage I_D = 1.0mA, $V_{DS} \geq V_{GS}$	$V_{GS(th)}$	2.0	-	4.0	V
Gate to Source Leakage Current V_{DS} = 0V, V_{GS} = +/- 20V	I_{GSS}	-	-	+/-100	nA
Drain Current V_{DS} = 120V, V_{GS} = 0V	I_{DSS}	-	-	25	µA
Drain Source On Resistance [1] V_{GS} = 10V, I_D = 45A	$R_{DS(ON)}$	-	9	11	mΩ
Source Drain Diode, Forward Voltage [1), 2)] V_{GS} = 0V, I_S = 57A	V_{SD}	-	-	1.2	V
AC Characteristics					
Turn-on Delay Time V_{DD} = 50% V_{DS}, I_D = 45A, R_G = 4.7Ω	$t_{d(ON)}$	-	-	80	ns
Rise Time V_{DD} = 50% V_{DS}, I_D = 45A, R_G = 4.7Ω	t_r	-	-	140	ns
Turn-off Delay Time V_{DD} = 50% V_{DS}, I_D = 45A, R_G = 4.7Ω	$t_{d(OFF)}$	-	-	150	ns
Fall Time V_{DD} = 50% V_{DS}, I_D = 45A, R_G = 4.7Ω	t_f	-	-	140	ns
Reverse Recovery Time V_{DD} < 50% V_{DS}, I_D = 57A	t_{rr}	-	-	400	ns
Common Source Input Capacitance V_{DS} = 100V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	9.0	11.1	14.0	nF
Common Source Output Capacitance V_{DS} = 100V, V_{GS} = 0V, f = 1.0MHz	C_{oss}	800	1000	1200	pF
Common Source Reverse Transfer Capacitance V_{DS} = 100V, V_{GS} = 0V, f = 1.0MHz	C_{rss}	100	155	180	pF
Gate Resistance	R_G	-	0.8	-	Ω
Total Gate Charge V_{DD} = 50% V_{DS}, V_{GS} = 10V, I_D = 57A	Q_G	-	-	200	nC

Notes.:

1) Pulsed Measurement: Pulse Width < 300µs, Duty Cycle <2.0%.
2) Measured within 2.0 mm of case.

Electrical Characteristics

at T_A=125°C; unless otherwise specified

Parameter	Symbol	Values		Unit
		min.	max.	
DC Characteristics				
Gate Threshold Voltage I_D = 1.0mA, $V_{DS} \geq V_{GS}$	$V_{GS(th)}$	1.5	-	V
Gate to Source Leakage Current V_{DS} = 0V, V_{GS} = +/- 20V	I_{GSS}	-	+/-200	nA
Drain Current V_{DS} = 120V, V_{GS} = 0V	I_{DSS}	-	250	µA
Drain Source On Resistance [1)] V_{GS} = 10V, I_D = 45A	$r_{DS(on)}$	-	20	mΩ

Notes.:

1) Pulsed Measurement: Pulse Width < 300µs, Duty Cycle <2.0%.

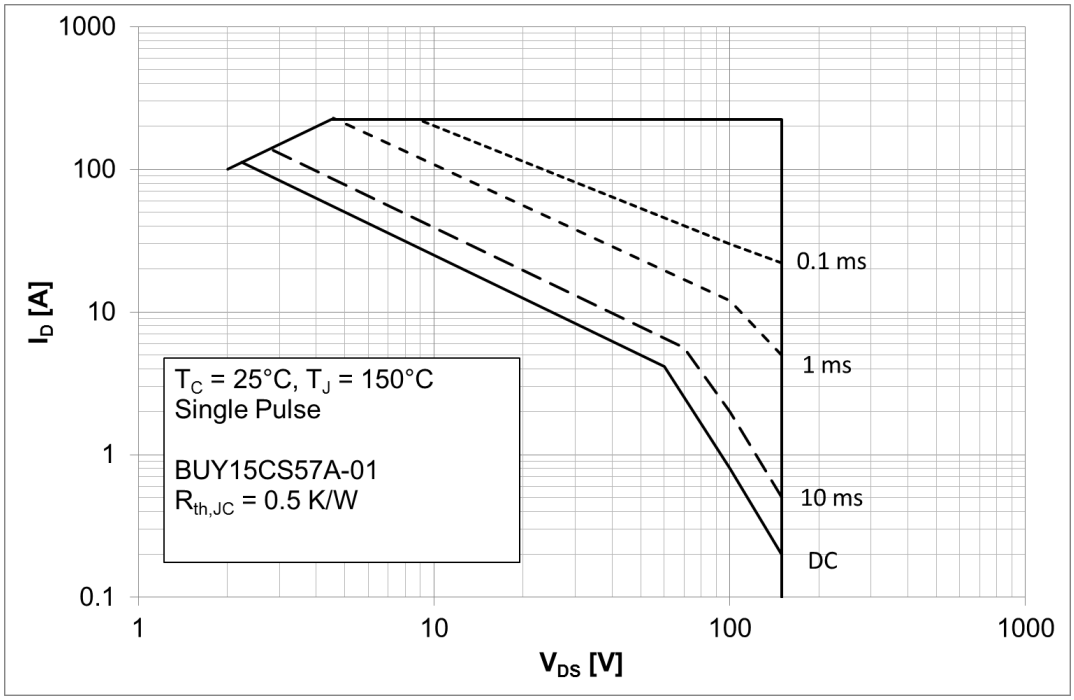
Electrical Characteristics

at T_A=-55°C; unless otherwise specified

Parameter	Symbol	Values		Unit
		min.	max.	
DC Characteristics				
Gate Threshold Voltage I_D = 1.0mA, $V_{DS} \geq V_{GS}$	$V_{GS(th)}$	-	5.0	V

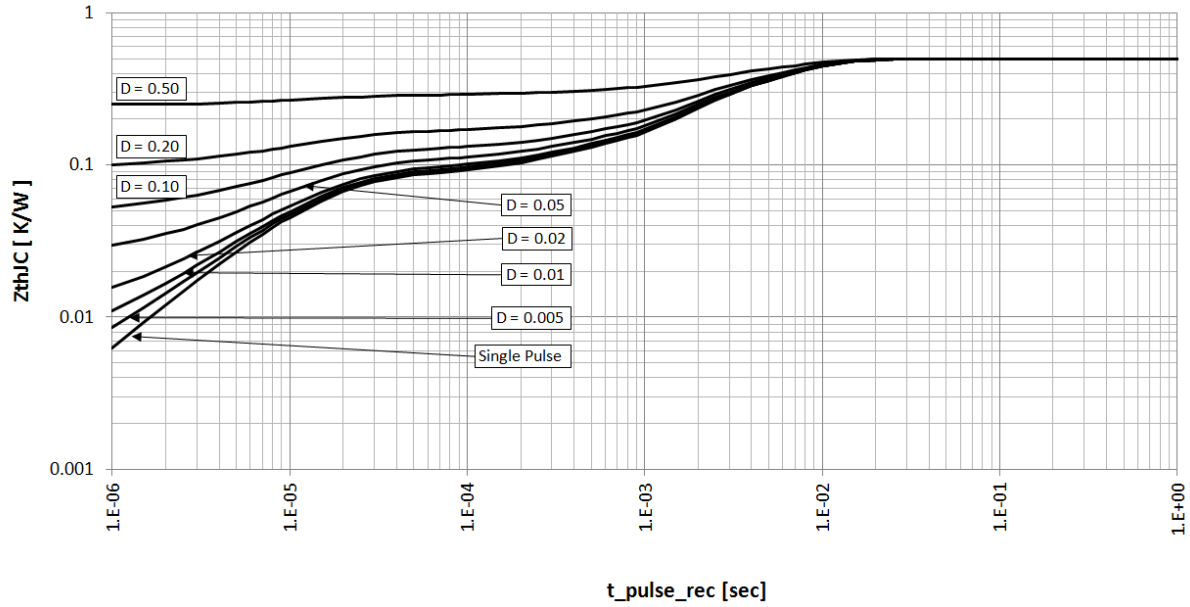
1 Safe operating area

$I_D = f(V_{DS})$; $T_C = 25°C$
parameter: t_p



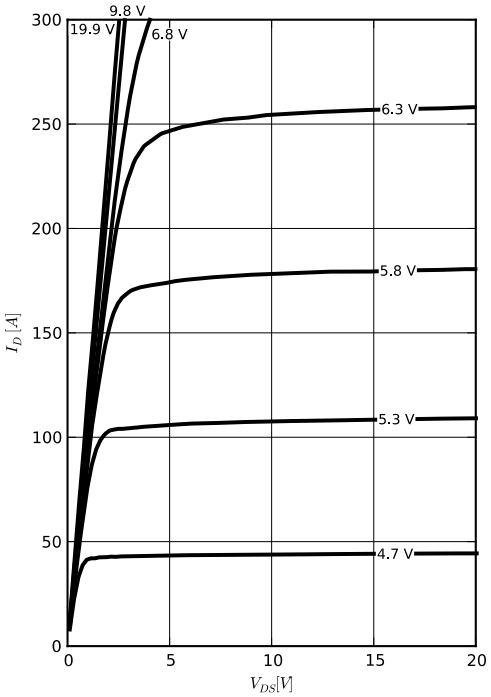
2 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$
parameter: $D = t_p/T$



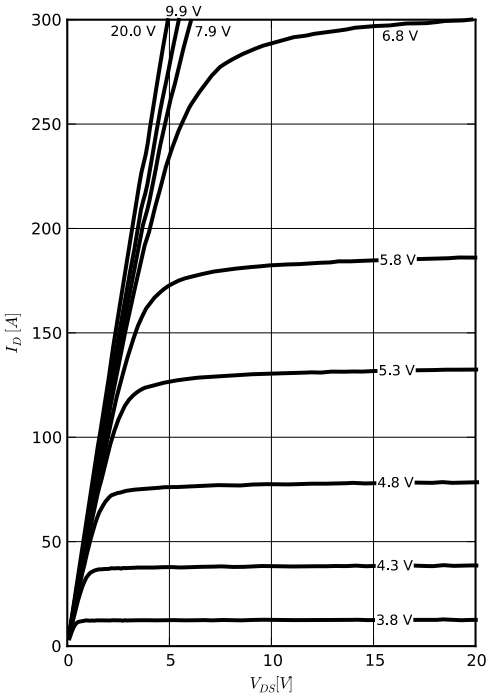
3 Typ. output characteristics

$I_D = f(V_{DS})$; T_j = 25 °C
parameter: V_{GS}



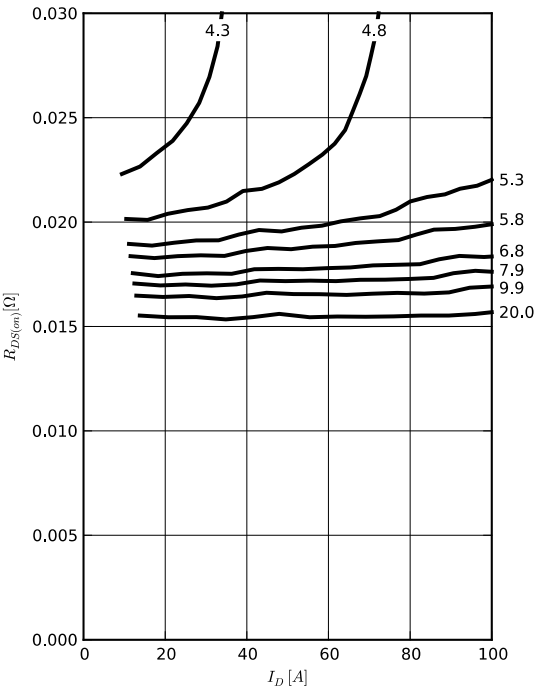
4 Typ. output characteristics

$I_D = f(V_{DS})$; T_j = 150 °C
parameter: V_G



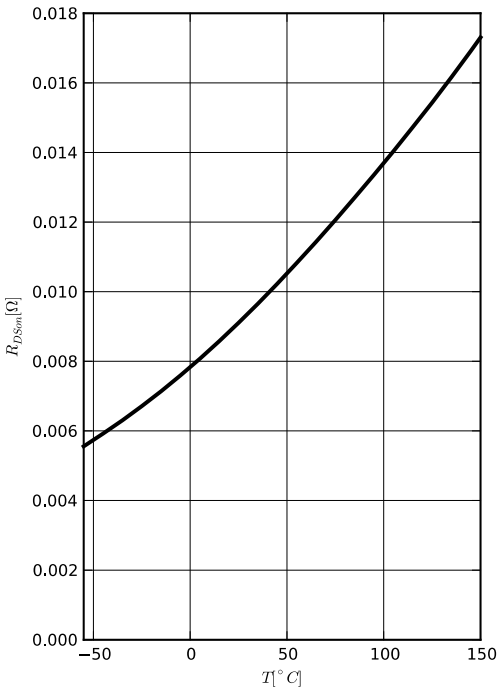
5 Typ. drain-source on-state resistance

$R_{DS(on)} = f(I_D)$; T_j = 150 °C
parameter: V_{GS}



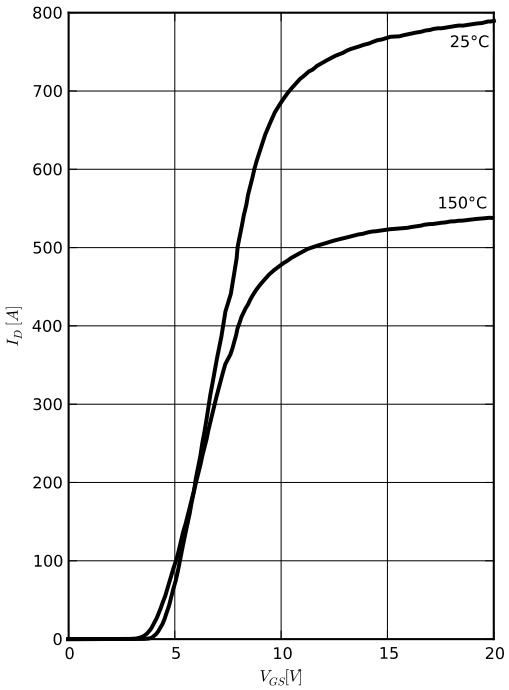
6 Typ. drain-source on-state resistance

$R_{DS(on)} = f(T_j)$
I_D=45A



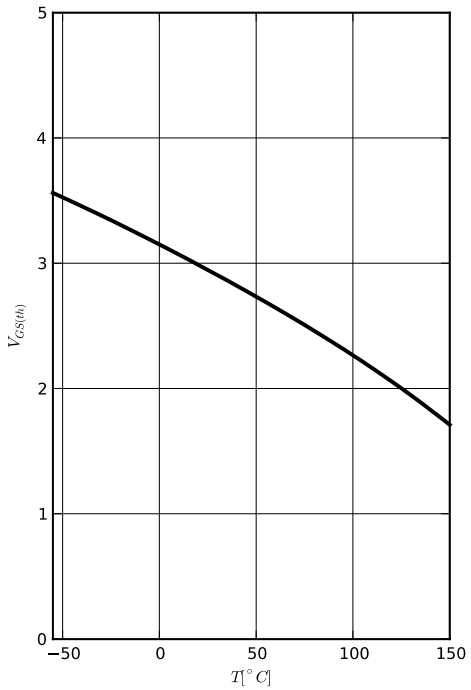
7 Typ. transfer characteristics

$I_D = f(V_{GS})$; $|VDS| > 2\ |I_D|\ R_{DS(on)max}$
parameter: T_j



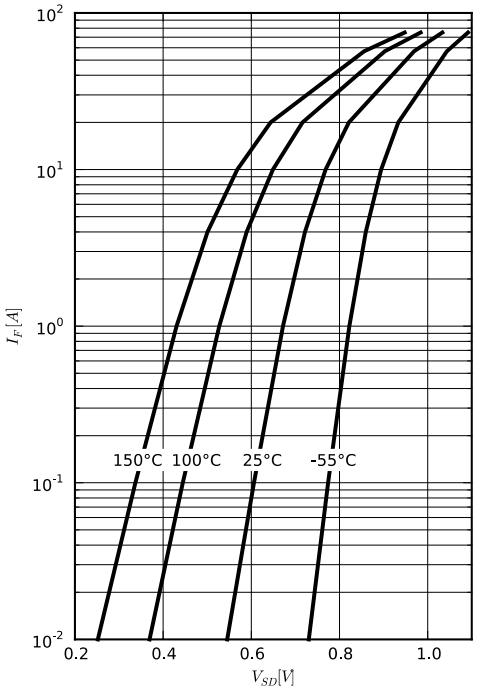
8 Typ. gate threshold voltage

$I_D=f(T_j)$
I_D = 1mA



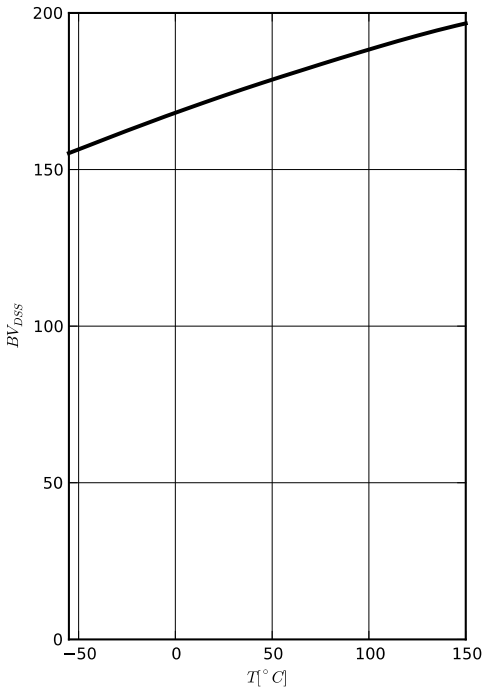
9 Typ. forward characteristics of reverse diode

$I_F = f(V_{SD})$
parameter: T_j



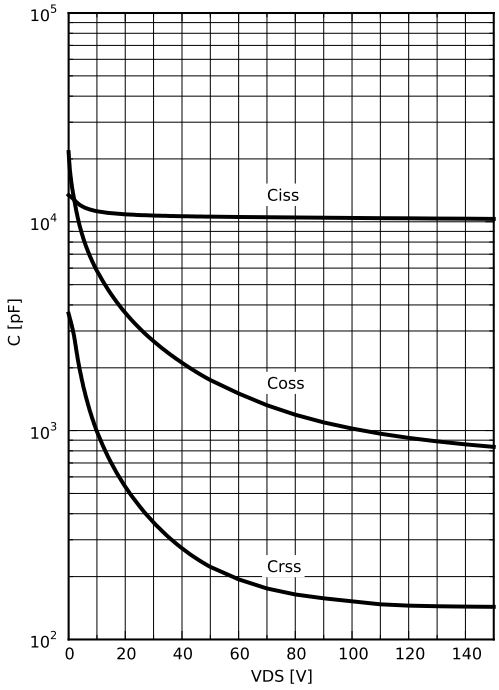
10 Typ. drain-source breakdown voltage

$BV_{DSS} = f(T_j)$
I_D = 250µA



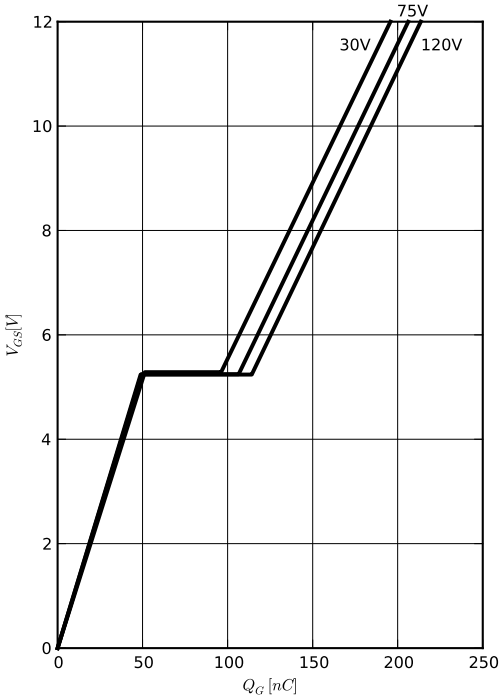
11 Typ. capacitances

$C = f(V_{DS})$; V_{GS} = 0 V; f = 1 MHz

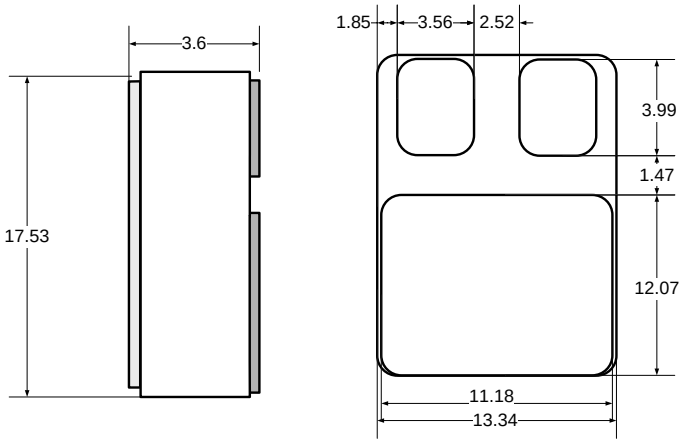


12 Typ. gate charge

$V_{GS} = f(Q_{gate})$; ID = 57 A pulsed
parameter: V_{DD}



SMD2 Package



Dimensions are typical [mm]

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