
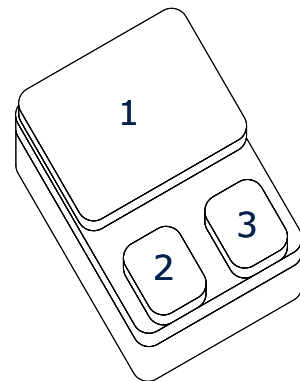


HiRel RadHard Power-MOS

- Low $R_{DS(on)}$
- Single Event Effect (SEE) hardened
 LET 73, Range: 253 μ m (Xe) LET 55, Range: 95 μ m (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				Package
		1	2	3	-	
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 $T_C = 25\text{ }^\circ\text{C}$ $T_C = 100\text{ }^\circ\text{C}$	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	$^\circ\text{C}$
Avalanche Energy	E_{AS}	520	mJ

Thermal Characteristics

Thermal Resistance (Junction to Case)	R_{thJC}	0.5	K/W
Soldering Temperature	T_{sol}	250	$^\circ\text{C}$

Notes.:

- 1) For $T_S \leq 25^\circ\text{C}$. For $T_S > 25^\circ\text{C}$ derating is required.
 2) limited by package.

Electrical Characteristics, at $T_A=25^\circ\text{C}$; unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Breakdown Voltage Drain to Source $I_D = 0.25\text{mA}$, $V_{GS} = 0\text{V}$	BV_{DSS}	150	-	-	V
Temperature Coefficient of BV_{DSS}	$\Delta BV_{DSS}/\Delta T_J$	-	0.20	-	V/ $^\circ\text{C}$
Gate Threshold Voltage $I_D = 1.0\text{mA}$, $V_{DS} \geq V_{GS}$	$V_{GS(th)}$	2.0	-	4.0	V
Gate to Source Leakage Current $V_{DS} = 0\text{V}$, $V_{GS} = +/- 20\text{V}$	I_{GSS}	-	-	+/-100	nA
Drain Current $V_{DS} = 120\text{V}$, $V_{GS} = 0\text{V}$	I_{DSS}	-	-	25	μA
Drain Source On Resistance ¹⁾ $V_{GS} = 10\text{V}$, $I_D = 45\text{A}$	$R_{DS(ON)}$	-	9	11	m Ω
Source Drain Diode, Forward Voltage ^{1), 2)} $V_{GS} = 0\text{V}$, $I_S = 57\text{A}$	V_{SD}	-	-	1.2	V

AC Characteristics

Turn-on Delay Time $V_{DD} = 50\% V_{DS}$, $I_D = 45\text{A}$, $R_G = 4.7\Omega$	$t_{d(ON)}$	-	-	80	ns
Rise Time $V_{DD} = 50\% V_{DS}$, $I_D = 45\text{A}$, $R_G = 4.7\Omega$	t_r	-	-	140	ns
Turn-off Delay Time $V_{DD} = 50\% V_{DS}$, $I_D = 45\text{A}$, $R_G = 4.7\Omega$	$t_{d(OFF)}$	-	-	150	ns
Fall Time $V_{DD} = 50\% V_{DS}$, $I_D = 45\text{A}$, $R_G = 4.7\Omega$	t_f	-	-	140	ns
Reverse Recovery Time $V_{DD} < 50\% V_{DS}$, $I_D = 57\text{A}$	t_{rr}	-	-	400	ns
Common Source Input Capacitance $V_{DS} = 100\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$	C_{iss}	9.0	11.1	14.0	nF
Common Source Output Capacitance $V_{DS} = 100\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$	C_{oss}	800	1000	1200	pF
Common Source Reverse Transfer Capacitance $V_{DS} = 100\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$	C_{rss}	100	155	180	pF
Gate Resistance	R_G	-	0.8	-	Ω
Total Gate Charge $V_{DD} = 50\% V_{DS}$, $V_{GS} = 10\text{V}$, $I_D = 57\text{A}$	Q_G	-	-	200	nC

Notes.:

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

2) Measured within 2.0 mm of case.

Electrical Characteristics

 at $T_A=125^\circ\text{C}$; unless otherwise specified

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

Notes.:

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

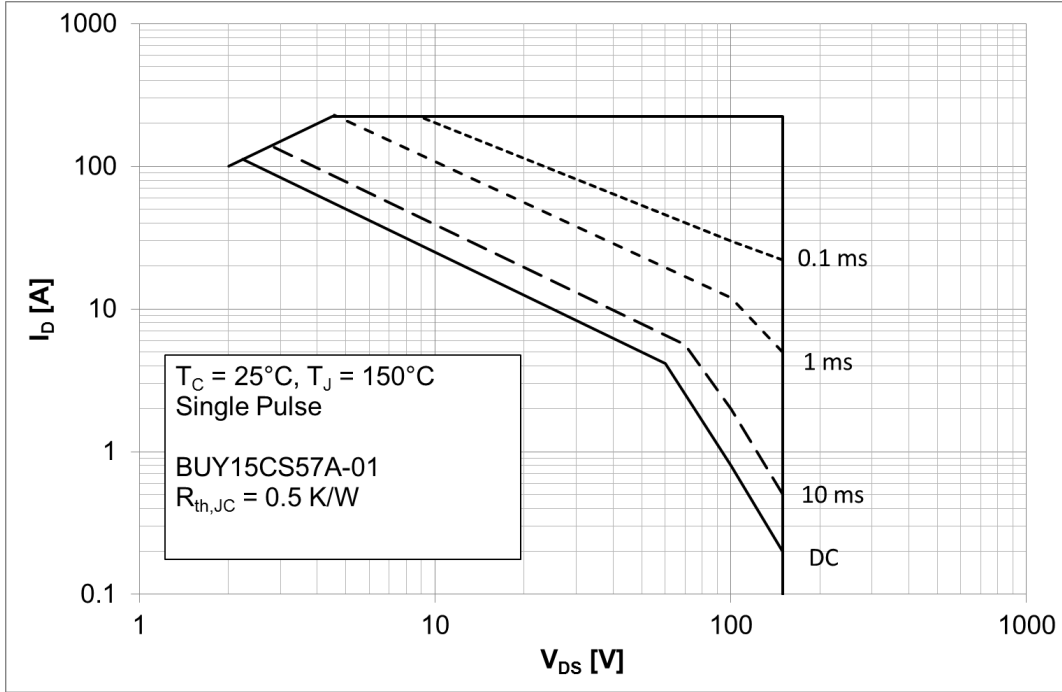
Electrical Characteristics

 at $T_A=-55^\circ\text{C}$; unless otherwise specified

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

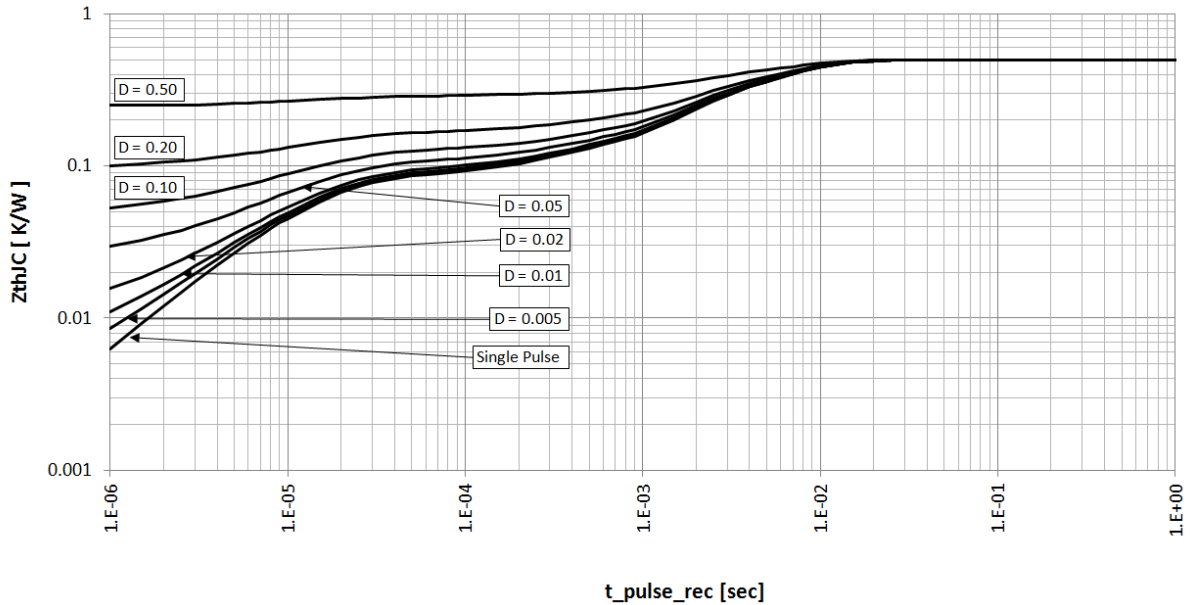
1 Safe operating area

$I_D = f(V_{DS}); T_C = 25^\circ\text{C}$
parameter: t_p



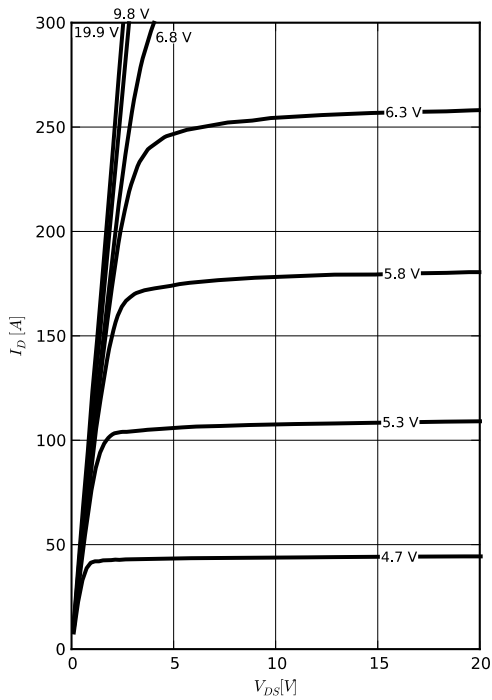
2 Max. transient thermal impedance

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



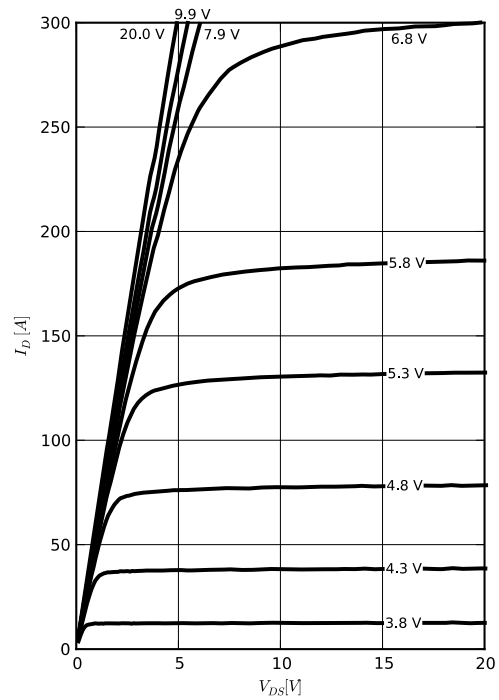
3 Typ. output characteristics

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



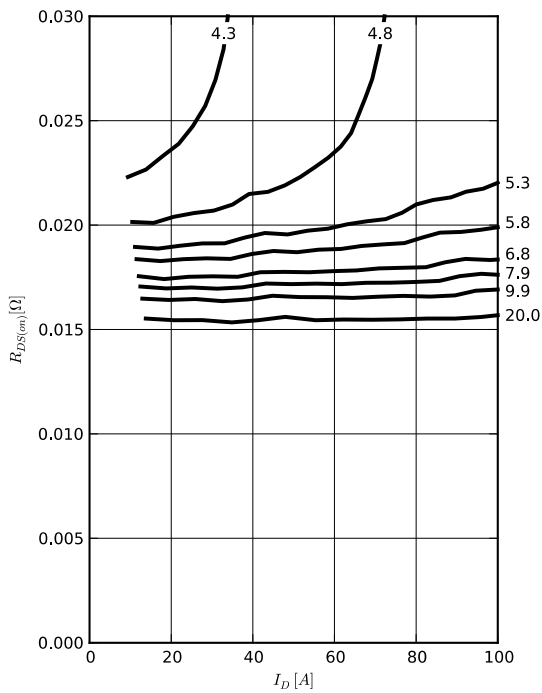
4 Typ. output characteristics

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



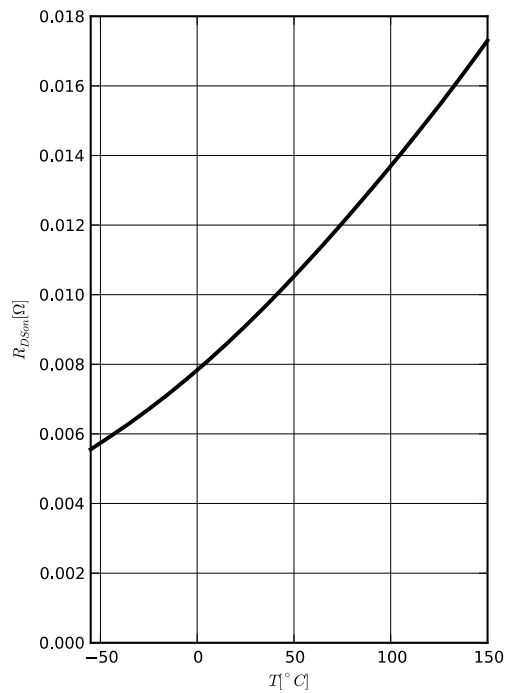
5 Typ. drain-source on-state resistance

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



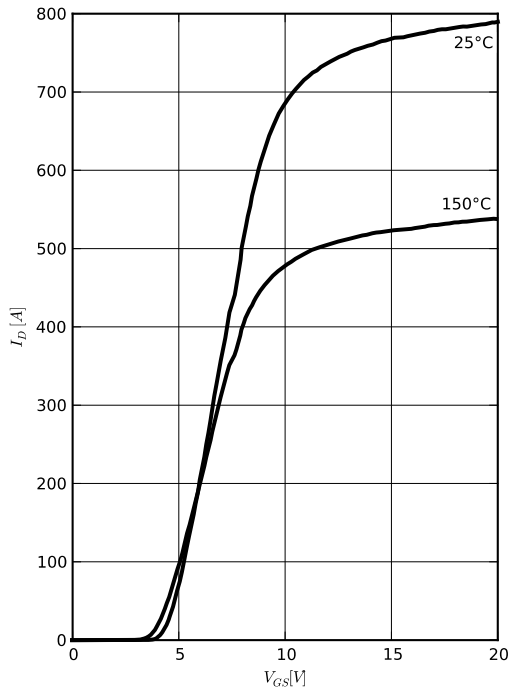
6 Typ. drain-source on-state resistance

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



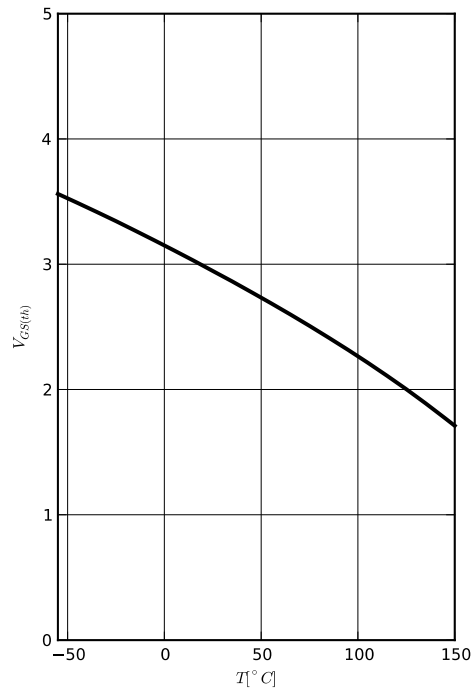
7 Typ. transfer characteristics

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



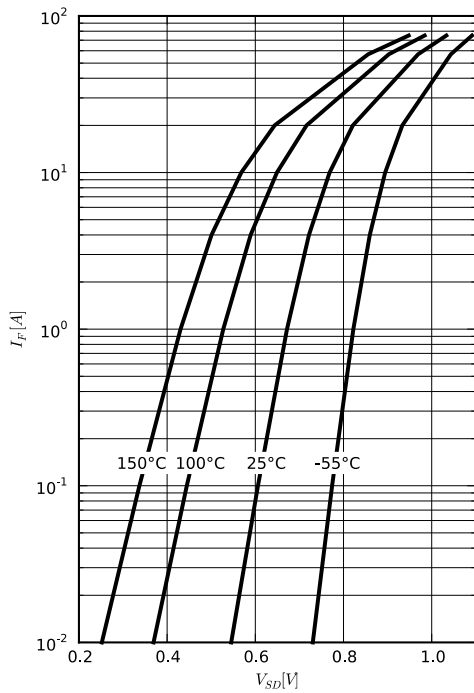
8 Typ. gate threshold voltage

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



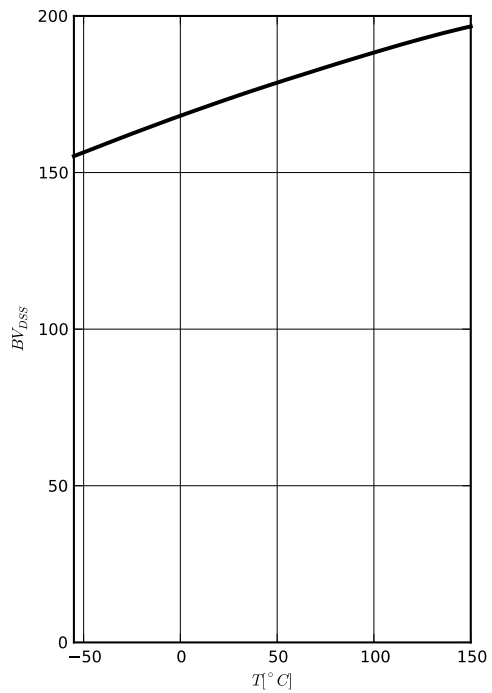
9 Typ. forward characteristics of reverse diode

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



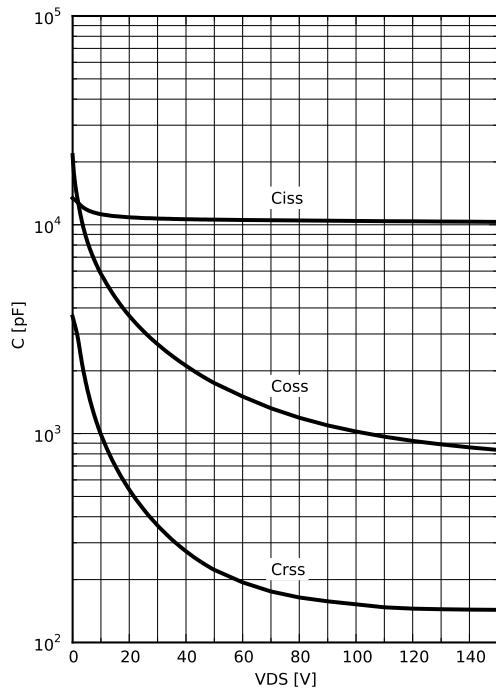
10 Typ. drain-source breakdown voltage

$BV_{DSS} = f(T_j)$
 $I_D = 250\mu A$



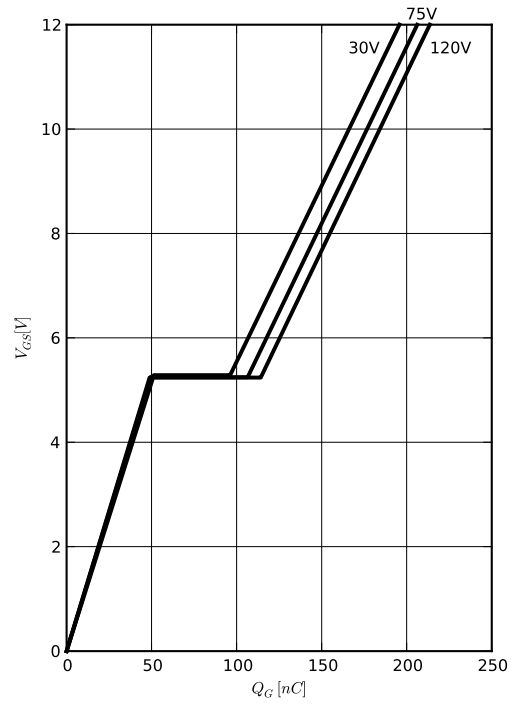
11 Typ. capacitances

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

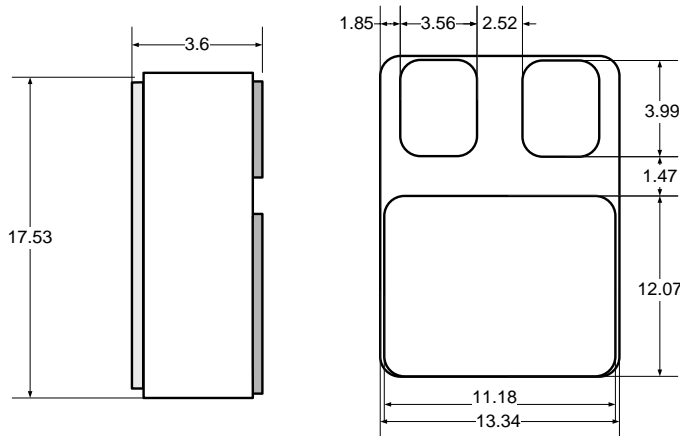


12 Typ. gate charge

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



SMD2 Package



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Dimensions are typical [mm]

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