

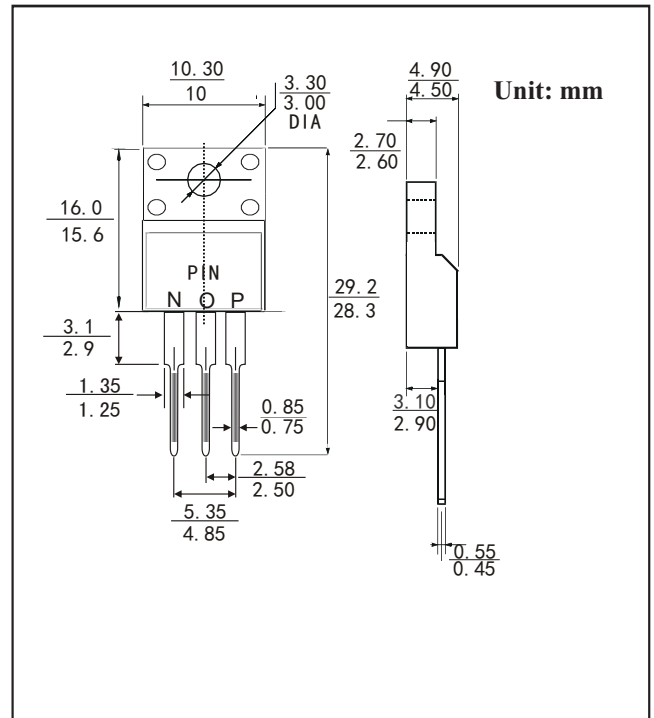
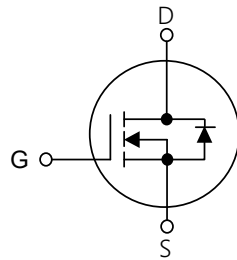
TO-220F 18A, 650V N-CHANNEL POWER MOSFET
FEATURES

- $R_{DS(ON)} < 0.25\Omega$ @ $V_{GS}=10V$
- Fast switching capability
- Low Gate Charge
- Lead free in compliance with EU RoHS directive.

SYMBOL

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram


ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, unless otherwise specified)

Parameter		Symbol	TO-220F		Unit
Drain-Source Voltage		V _{DS}	650		V
Gate-Source Voltage		V _{GS}	±30		V
Continuous Drain Current	T _C =25°C	I _D	18		A
	T _C =100°C		13		
Pulsed Drain Current (Note 1)		I _{DM}	55		A
Single Pulse Avalanche Energy(Note 2)		E _{AS}	320		mJ
Avalanche Current(Note 1)		I _{AR}	3		A
Repetitive Avalanche Energy(Note 1)		E _{AR}	2		mJ
Peak Diode Recovery dv/dt(Note 3)		dv/dt	15		V/ns
Drain Source voltage slope(V _{ds} =480V)		dV _{ds} /dt	50		V/ns
Power Dissipation T _C =25°C		P _D	151	35	W
Operating Junction and Storage Temperature		T _J /T _{STG}	-55 ~ +150		°C
Maximum Temperature for soldering		T _L	300		°C

Table 2. Thermal Characteristics

Parameter	Symbol	TO-220/TO-263	ITO-220	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62	62	$^{\circ}\text{C/W}$
Thermal resistance Junction to Case	$R_{\theta JC}$	0.82	3.57	$^{\circ}\text{C/W}$

 Table 3. Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V,I _D =250μA	650	--	--	V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =650V,V _{GS} =0V	--	--	1	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =30V,V _{DS} =0V	--	--	100	nA
	Reverse		V _{GS} =-30V,V _{DS} =0V	--	--	-100	nA
On Characteristics(Note 4)							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} ,I _D =250μA	2.5	--	4.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V,I _D =9A	--	--	0.45	Ω
Dynamic Characteristics(Note 5)							
Input Capacitance		C _{ISS}	V _{DS} =25V,V _{GS} =0V,f=1MHz	--	1230	--	pF
Output Capacitance		C _{OSS}		--	30	--	pF
Reverse Transfer Capacitance		C _{RSS}		--	2.6	--	pF
Switching Characteristics (Note 5)							
Turn-On Delay Time		t _{d(on)}	V _{DD} =400V,I _D =9A, R _G =20Ω	--	20	--	ns
Turn-On Rise Time		t _R		--	17	--	ns
Turn-Off Delay Time		t _{d(off)}		--	170	--	ns
Turn-Off Fall Time		t _f		--	13	--	ns
Total Gate Charge		Q _G	V _{DS} =400V,I _D =9A, V _{GS} =10V	--	42	--	nC
Gate-Source Charge		Q _{GS}		--	6	--	nC
Gate-Drain Charge		Q _{GD}		--	29	--	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _S =9A	--	--	1.5	V
Maximum Continuous Drain-Source Diode Forward Current		I _S		--	--	18	A
Reverse Recovery Time		trr	V _{GS} =0V, I _F =9A	--	380	--	ns
Reverse Recovery Charge		Q _{RR}	di _F /dt=100A/μs (Note 1)	--	4500	--	nC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature

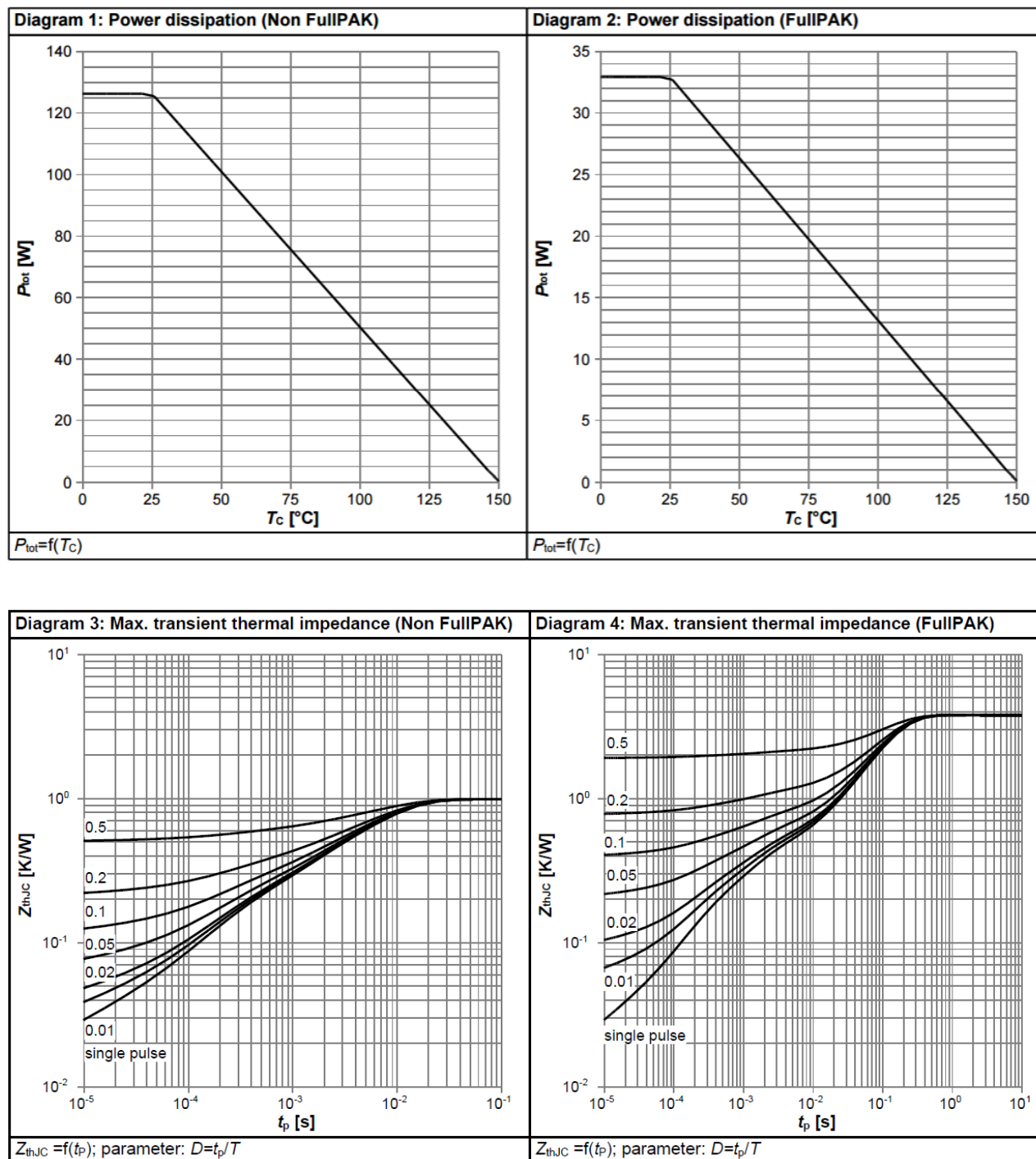
 2 $L=60\text{mH}, I_{AS}=4A, V_{DD}=150V$, Starting $T_J=25^{\circ}\text{C}$

 3 $I_{SD}\leq 4.5A, di/dt\leq 200A/\mu s, V_{DD}\leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$

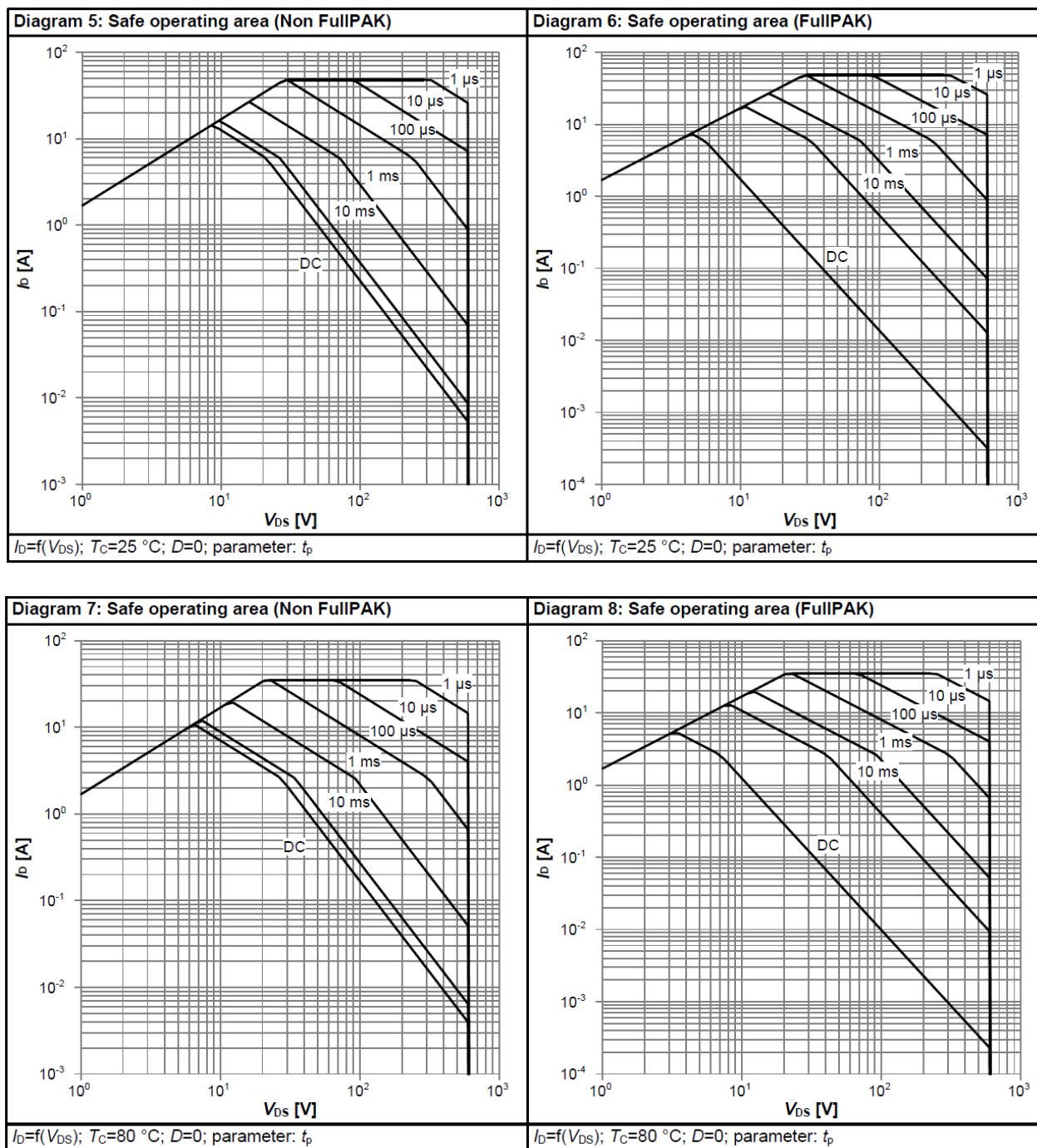
 4 Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

5 Guaranteed by design, not subject to production

Typical characteristics Diagrams

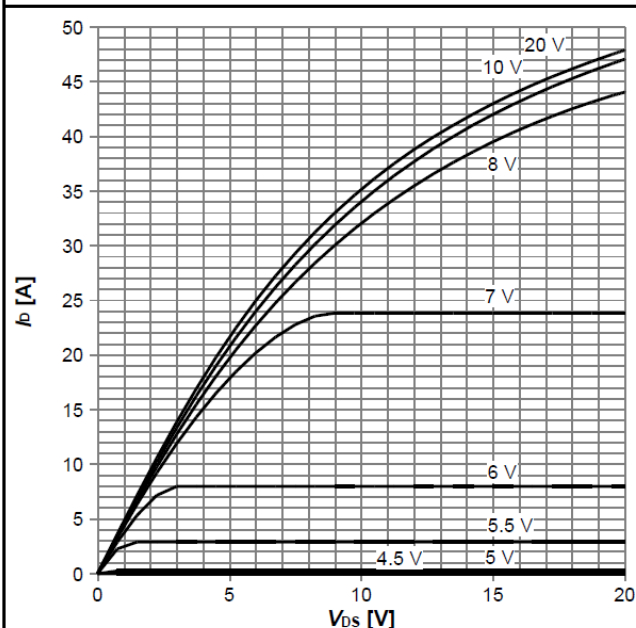


Typical characteristics Diagrams



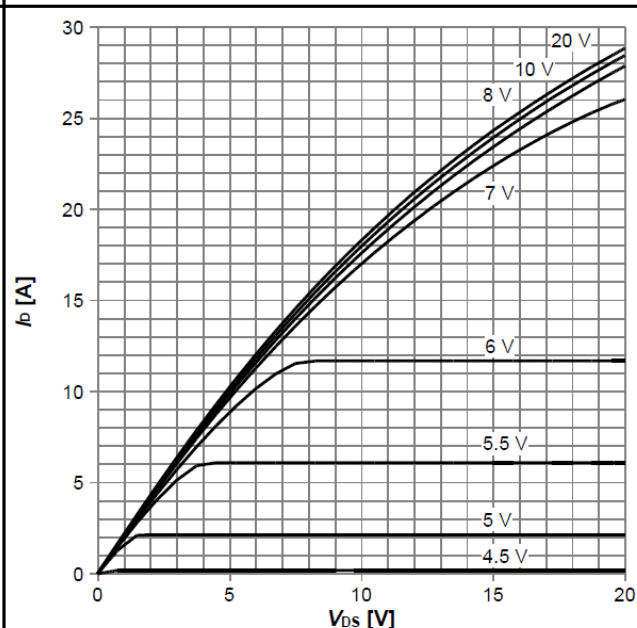
Typical characteristics Diagrams

Diagram 9: Typ. output characteristics



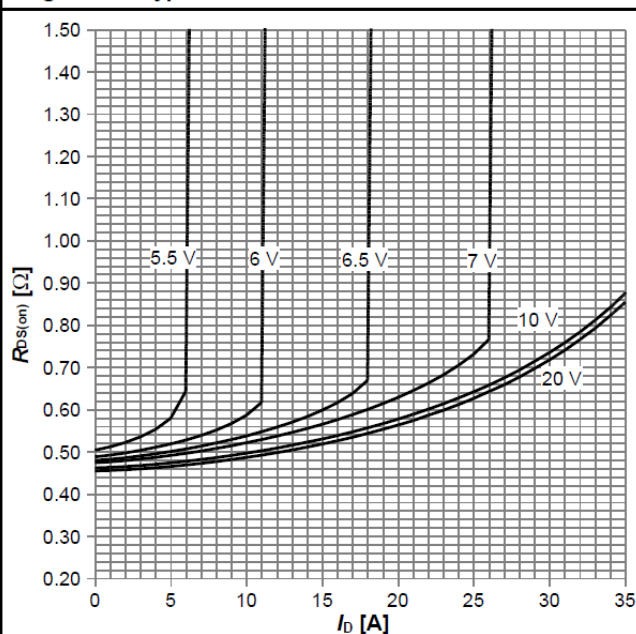
$I_D = f(V_{DS})$; $T_J = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 10: Typ. output characteristics



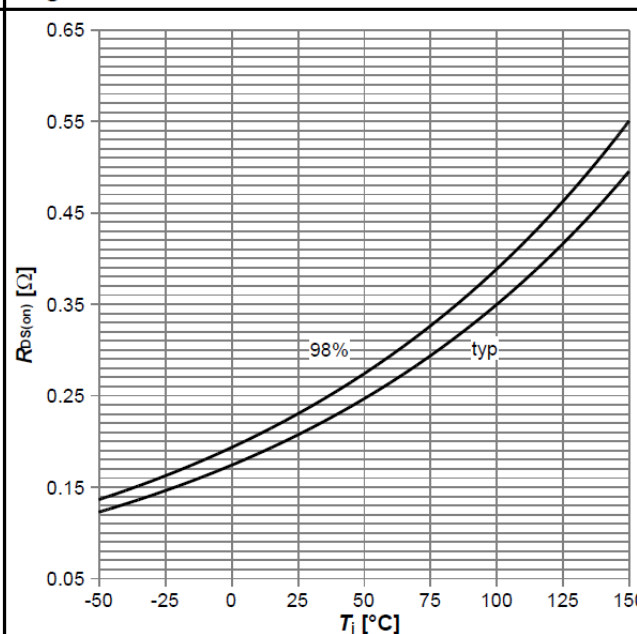
$I_D = f(V_{DS})$; $T_J = 125^\circ\text{C}$; parameter: V_{GS}

Diagram 11: Typ. drain-source on-state resistance



$R_{DS(on)} = f(I_D)$; $T_J = 125^\circ\text{C}$; parameter: V_{GS}

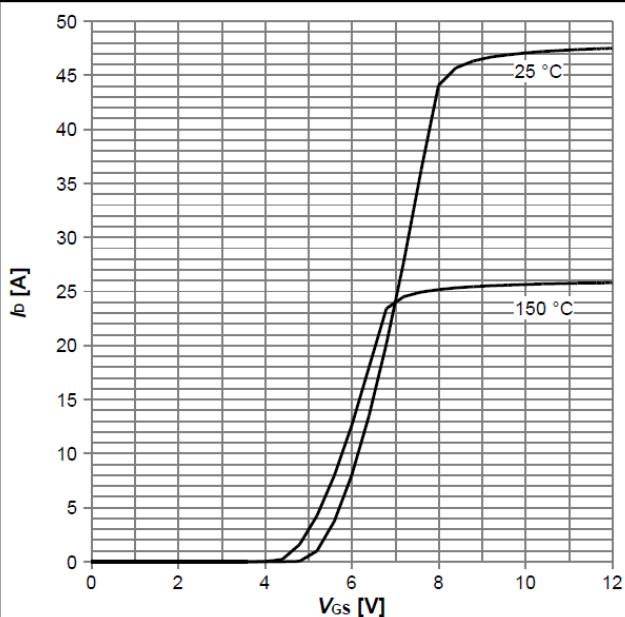
Diagram 12: Drain-source on-state resistance



$R_{DS(on)} = f(T_J)$; $I_D = 6.4\text{ A}$; $V_{GS} = 10\text{ V}$

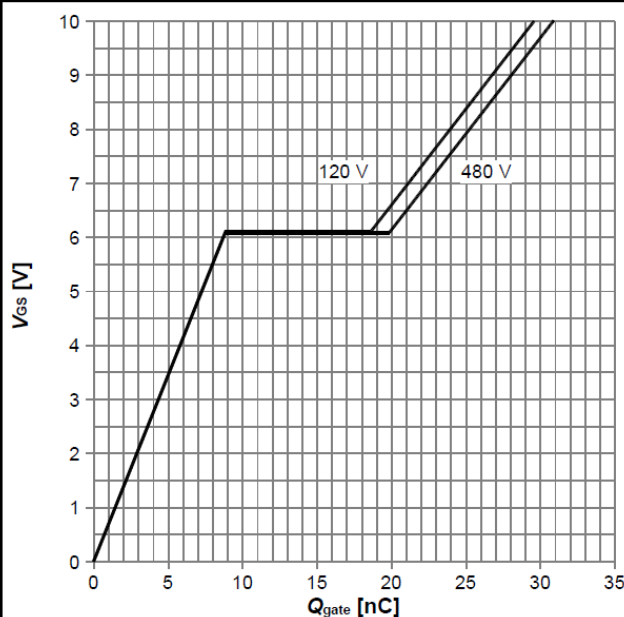
Typical characteristics Diagrams

Diagram 13: Typ. transfer characteristics



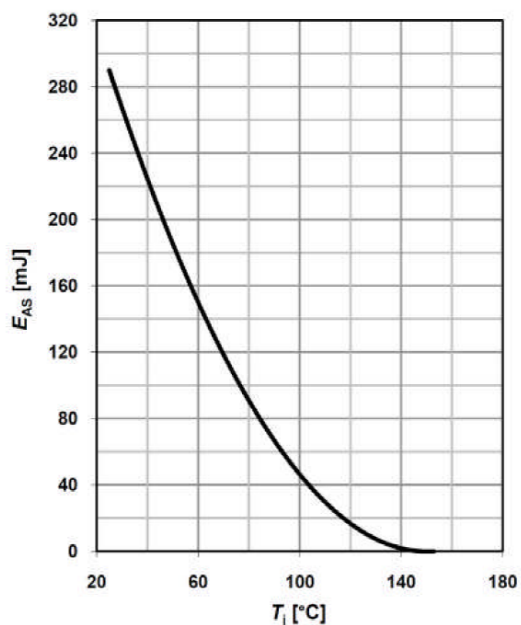
$I_D = f(V_{GS}); V_{DS} = 20V$; parameter: T_j

Diagram 14: Typ. gate charge



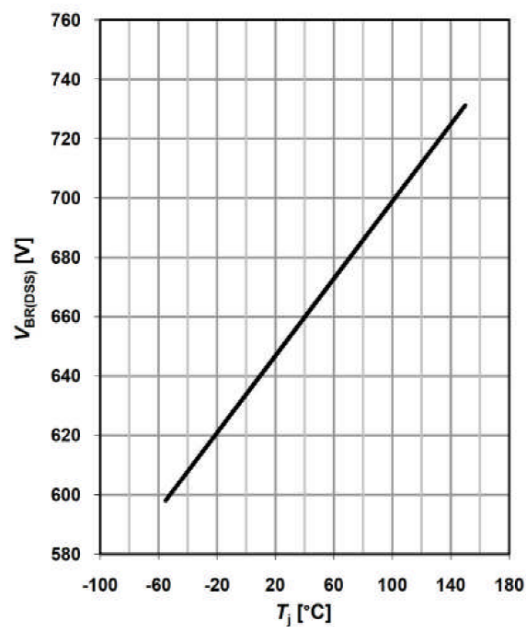
$V_{GS} = f(Q_{gate}); I_D = 8.0 A$ pulsed; parameter: V_{DD}

Avalanche energy



$E_{AS} = f(T_j); I_D = 2.4 A; V_{DD} = 50 V$

Drain-source breakdown voltage



$V_{BR(DSS)} = f(T_j); I_D = 0.25 mA$