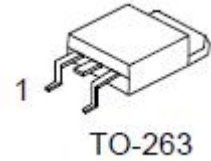# ATM06P50TC

## P-Enhancement Mode Field Effect Transistor

Description

The ATM06P50TC is a P-channel power MOSFET using advanced technology to provide the customers with high switching speed and a minimum on-state resistance, and it can also withstand high energy in the avalanche.
This ATM06P50TC is suitable for load switch, etc.

TO-263

Features

- High Switching Speed
- $R_{DS(ON)} < 15m\Omega$ @ V_{GS}=-10V，I_D=-17A

2.Drain

1.Gate
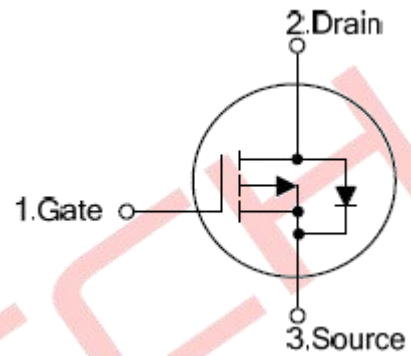
3.Source

Absolute Maximum Ratings (Ta=25℃ unless otherwise specified)

Parameter			Symbol	Maximum	Units
Drain-Source Voltage			V_{DS}	-60	V
Gate-Source Voltage			V_{GS}	$\pm$20	V
Drain Current	Continuous(T_J=175℃)	T_C=25℃	I_D	-50(Note 5)	A
		T_C=125℃		-27.5	A
	Pulsed		I_{DM}	-80	A
Avalanche Current			I_{AR}	-50	A
Single Pulse Avalanche Energy(Note 2)	L=0.1mH		E_{AS}	125	mJ
Power Dissipation	T_C=25℃		P_D	113(Note 4)	W
	T_A=25℃			2.5(Note 3,4)	W
Operating Junction and Storage Temperature Range			T_J,T_{STG}	-55 ~ +150	℃
Parameter			Symbol	Value	Unit
Maximum Junction-to-Ambient			$R_{\theta JA}$	62.5	℃/W
Maximum Junction-to-Case			$R_{\theta JC}$	1.1	℃/W

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

    2.Duty cycle≤1%.

    3.When Mounted on 1" square PCB (FR-4 material).

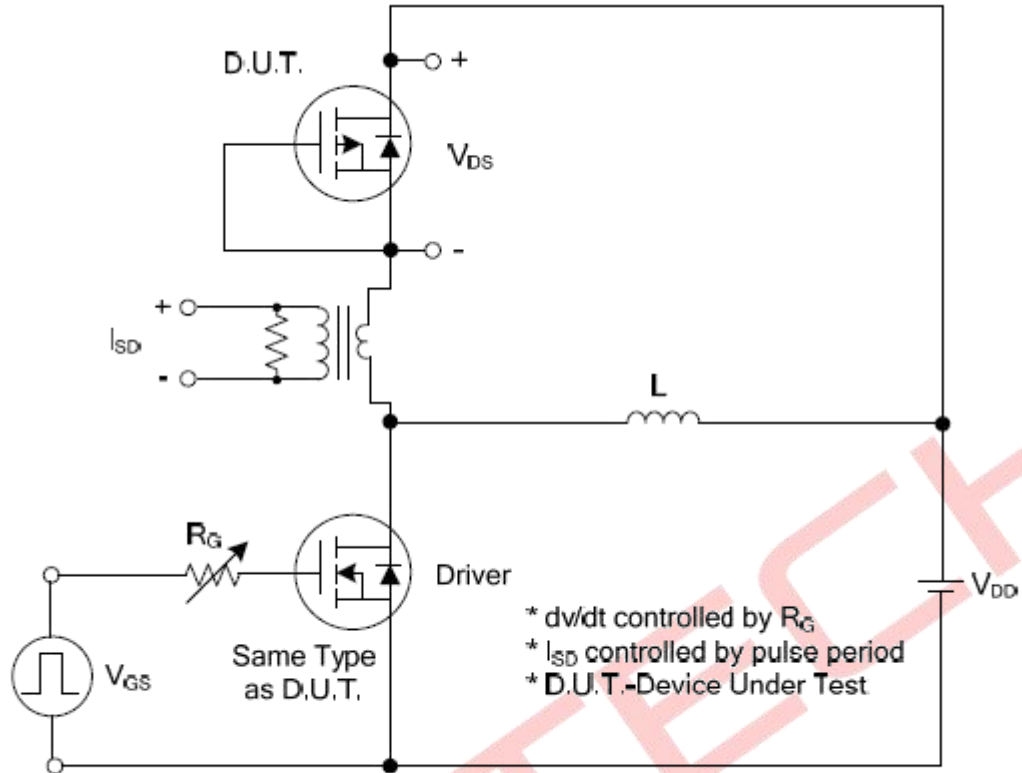   4.See SOA curve for voltage derating.

    5.Package limited.

ATM06P50TC

Electrical Characteristics (Ta=25℃ unless otherwise specified)

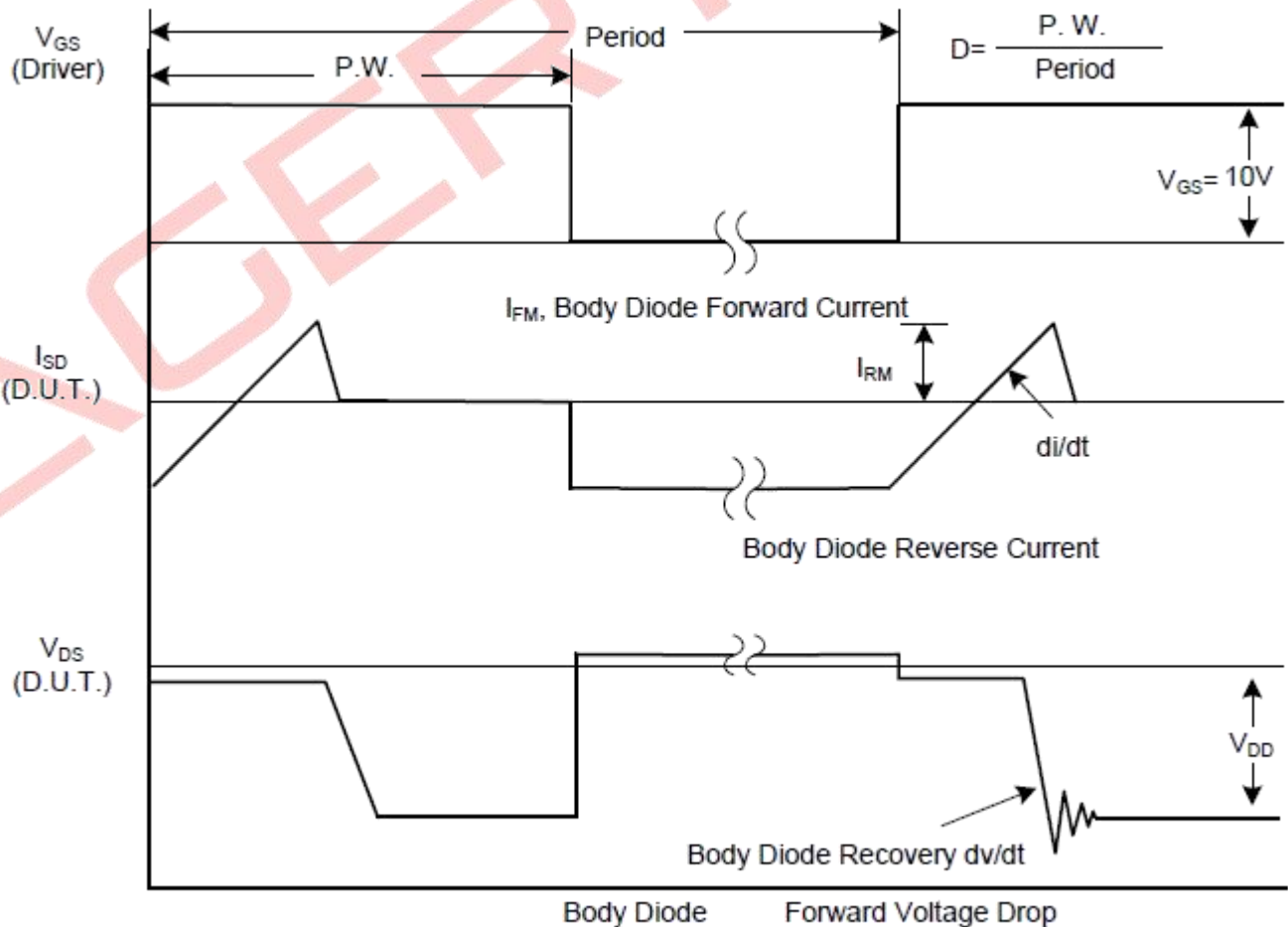| Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Parameters						
Drain-Source breakdown voltage	BV_{DSS}	ID=-250uA,VGS=0V	-60	-	-	V
Drain-Source Leakage current	IDSS	VDS=-60V,VGS=0V	-	-	-1	uA
Gate-Source leakage current	IGSS	VDS=0V,VGS=±20V	-	-	±100	nA
Gate Threshold voltage	VGS(th)	VGS=VDS，ID=-250uA	-1	-	-3	V
Static Drain-source on-resistance[1]	$R_{DS(on)}$	VGS=-10V，ID=-17A	-	-	15	mΩ
		VGS=-4.5V,ID=-14A	-	-	20	mΩ
On State Drain Current[1]	$I_{D(ON)}$	VGS=-10V，VDS=-5V	-50	-	-	A
Dynamic Parameters[2]						
Input Capacitance	Ciss		-	5470	-	pF
Output capacitance	Coss	VGS=0V,VDS=-25V,f=1MHZ	-	542	-	pF
Reverse transfer capacitance	Crss		-	346	-	pF
Switching Parameters[2,3]						
Total Gate charge	Qg		-	110	-	nC
Gate Source charge	Qgs	VGS=-10V,VDS=-30V,ID=-50A	-	19	-	nC
Gate Drain charge	Qgd		-	28	-	nC
Turn-on delaytime	tD(on)		-	19	-	ns
Turn-on rise time	tr	VDD=-30V,RL=0.6Ω,ID=-50A,	-	22	-	ns
Turn-off delaytime	tD(off)	VGE=-10V,RG=6Ω	-	120	-	ns
Turn-off fall time	tf		-	65	-	ns
Source-Drain Diode characteristics[2]						
Maximum Body-Diode Continuous Current	Is		-	-	-50	A
Maximum Body-Diode Pulsed Current	ISM		-	-	-80	A
Body Diode Voltage	V_{SD}	IF=-50A,VGS=0V	-	-	-1.6	V
Body Diode Reverse Recovery Time	trr	IF=-30A,dI/dt=100A/us	-	55	-	ns

Notes:

1.Pulse test: pulse width<=300uS, duty cycle<=2%.

2.Guaranteed by design,not subject to production testing.
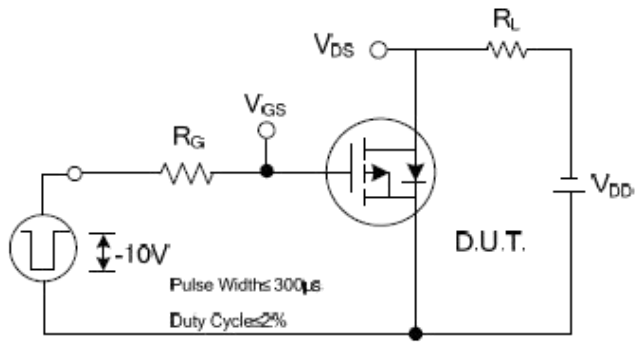
3.Independent of operating temperature.

ATM06P50TC

Peak Diode Recovery dv/dt Test Circuit

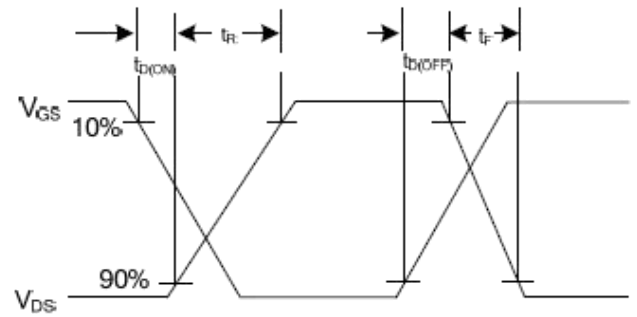* dv/dt controlled by R_G
* I_{SD} controlled by pulse period
* D.U.T.-Device Under Test

$$D = \frac{P.W.}{Period}$$

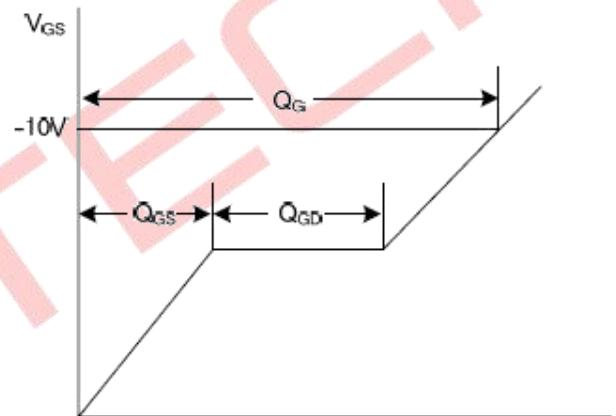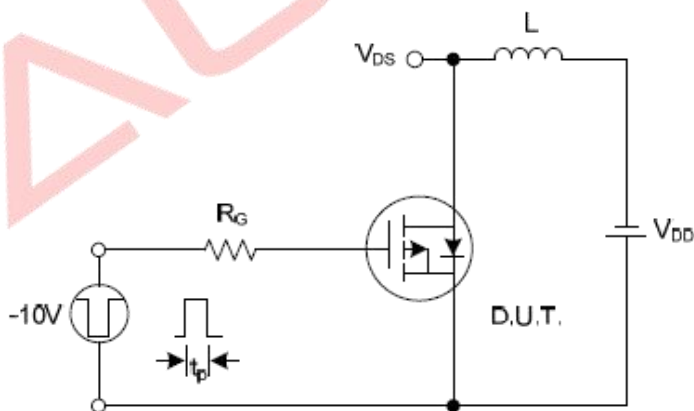Peak Diode Recovery dv/dt Waveforms
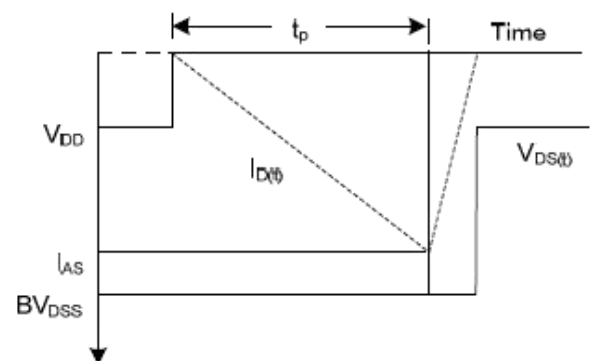
Switching Test Circuit

Switching Waveforms
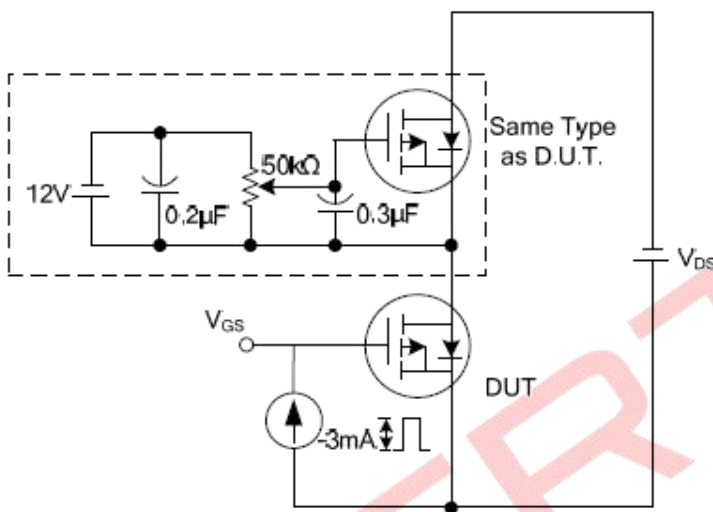
Gate Charge Test Circuit

Gate Charge Waveform

Unclamped Inductive Switching Test Circuit
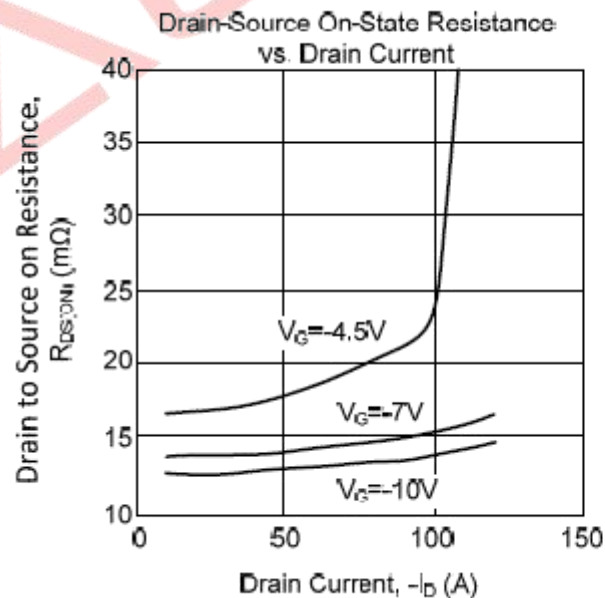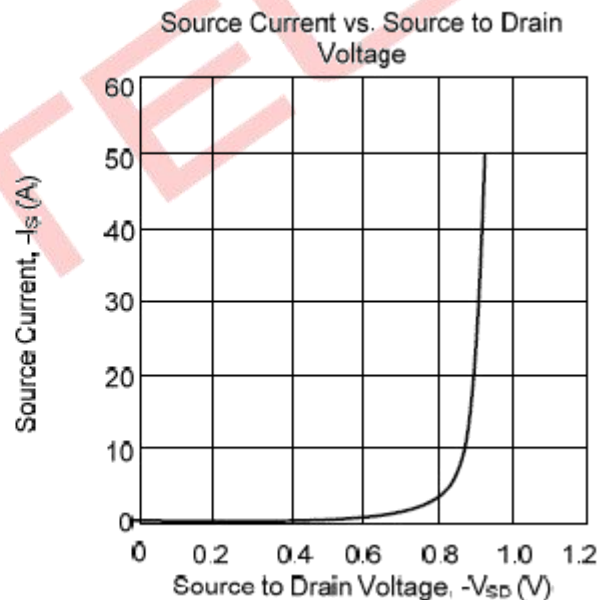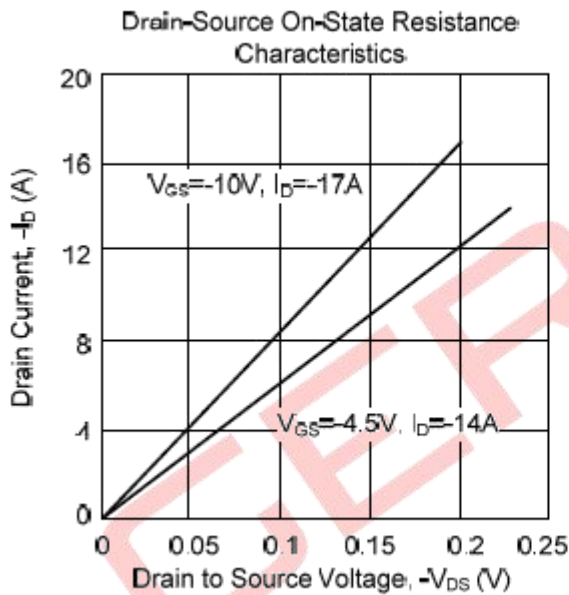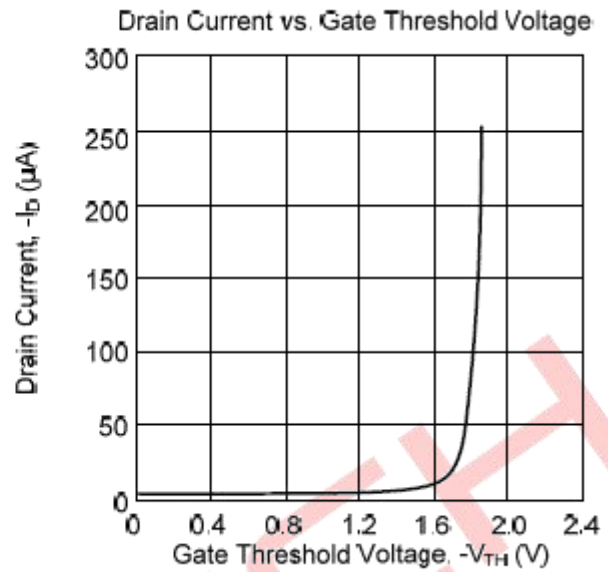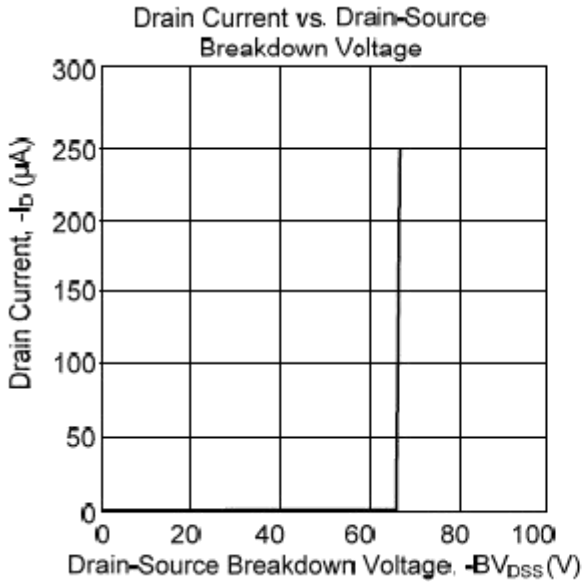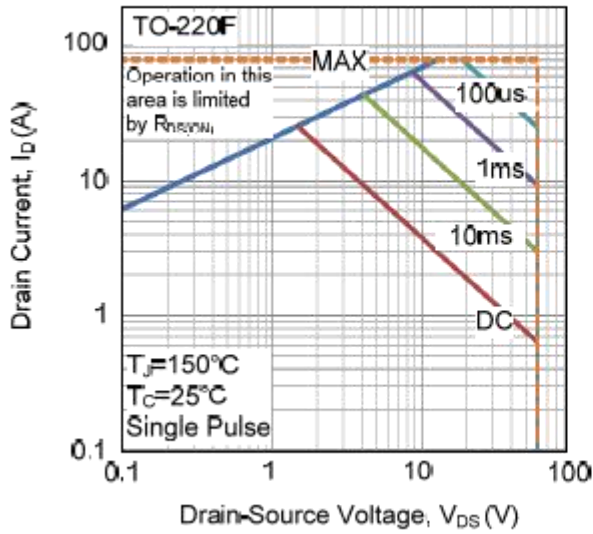

Unclamped Inductive Switching Waveforms

ATM06P50TC

Typical Characteristics

Drain Current vs. Drain-Source Breakdown Voltage

Drain Current vs. Gate Threshold Voltage

Drain-Source On-State Resistance Characteristics

Source Current vs. Source to Drain Voltage

Drain-Source On-State Resistance vs. Drain Current

Capacitance Characteristics
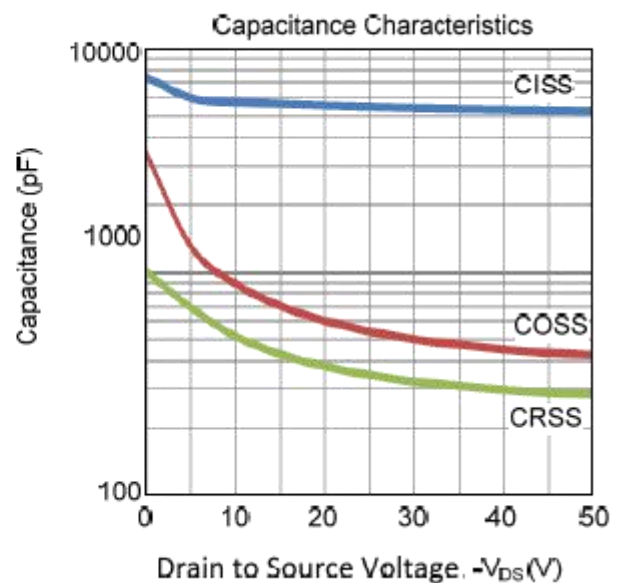
ATM06P50TC

Safe Operating Area

TO-220F
MAX
Operation in this area is limited by $R_{DS(ON)}$
100us
1ms
10ms
DC
T_J=150°C
T_C=25°C
Single Pulse

Gate Charge Characteristics

I_D=-50A
V_{DS}=-30V
V_{DS}=-48V
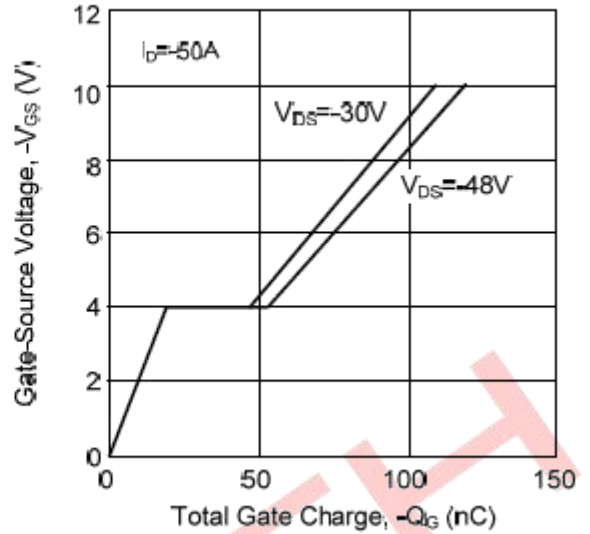
Maximum Drain Current vs. Case Temperature
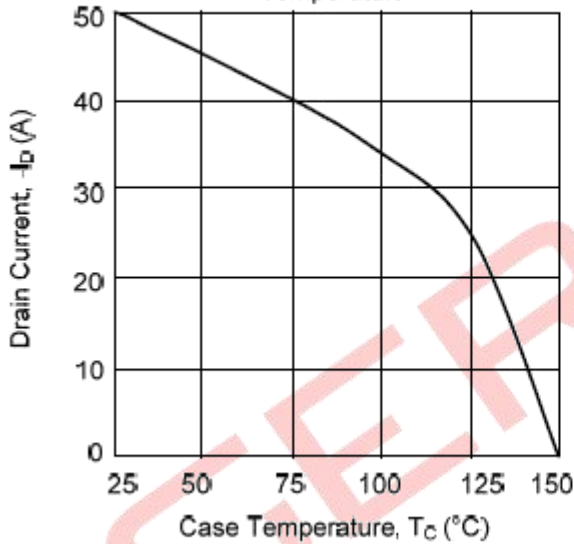
Maximum Safe Operating Area

1ms
100ms
DC
TO-220
Notes:
1.T_C=25°C
2.Single Pulse
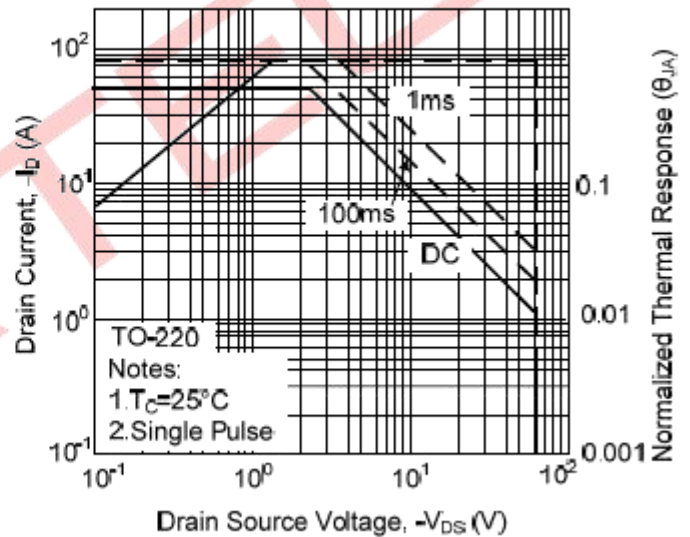
Power Dissipation vs. Junction Temperature
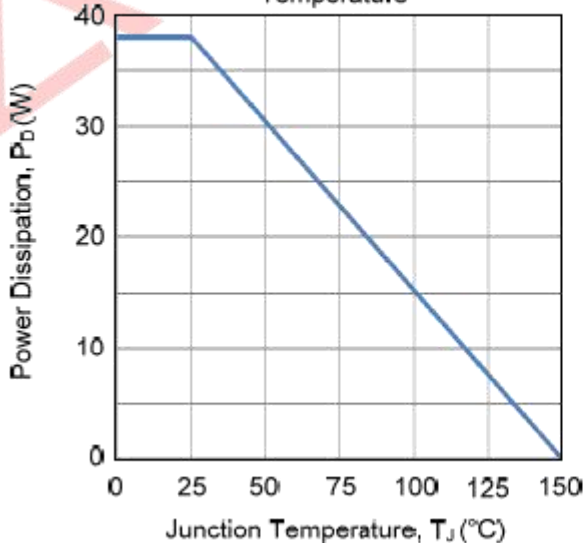
Transient Thermal Response Curve

D=0.5
0.2
0.1
0.05
0.02
0.01
Single pulse
TO-220F
Note:
1. $Z_{\theta JC}(t)$ = 3,3°C/W Max,
2. Duty Factor, D=t1/t2
3. T_J-T_C=P_{DM}×$Z_{\theta JC}(t)$