

# SLF65R280E7C / SLP65R280E7C

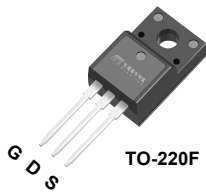
## 650V N-Channel Multi-EPI Super-JMOSFET

### General Description

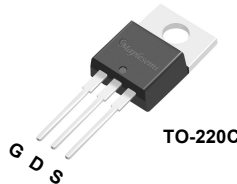
This Power MOSFET is produced using Msemitek's advanced Superjunction MOSFET technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies.

### Features

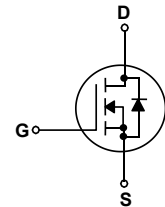
- 15A, 650V @  $T_{J,max}$ ,  $R_{DS(on)Typ} = 238m\Omega @ V_{GS} = 10V$
- Low gate charge (typ.  $Q_g = 21.0nC$ )
- High ruggedness
- Ultra fast switching
- 100% avalanche tested
- Improved dv/dt capability



TO-220F



TO-220C



### Absolute Maximum Ratings

$T_C = 25^\circ C$  unless otherwise noted

Symbol	Parameter	SLF65R280E7C / SLP65R280E7C		Units
$V_{DSS}$	Drain-Source Voltage	650		V
$I_D$	Drain Current * - Continuous ( $T_C = 25^\circ C$ ) - Continuous ( $T_C = 100^\circ C$ )	15		A
		8.0		A
$I_{DM}$	Drain Current * - Pulsed (Note 1)	37.5		A
$V_{GSS}$	Gate-Source Voltage	$\pm 30$		V
EAS	Single Pulsed Avalanche Energy (Note 2)	54		mJ
$I_{AR}$	Avalanche Current (Note 1)	3.0		A
$E_{AR}$	Repetitive Avalanche Energy (Note 1)	1.11		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	20		V/ns
	MOSFET dv/dt	100		
$P_D$	Power Dissipation ( $T_C = 25^\circ C$ ) - Derate above $25^\circ C$	30	100	W
		0.24	0.8	W/ $^\circ C$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150		$^\circ C$
$T_L$	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	260		$^\circ C$

\* Drain current limited by maximum junction temperature.

### Thermal Characteristics

Symbol	Parameter	SLF65R280E7C / SLP65R280E7C		Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.1	1.25	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	-	$^\circ C/W$

## Package Marking

Part Number	Top Marking	Package	Packing Method	MOQ	QTY
SLF65R280E7C	SLF65R280E7C	TO-220F	Tube	1000	5000
SLP65R280E7C	SLP65R280E7C	TO-220C	Tube	1000	5000

## Electrical Characteristics

$T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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### Off Characteristics

$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	650	--	--	V
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}, T_J = 150^\circ\text{C}$	700	--	--	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	--	--	1.0	$\mu\text{A}$
		$V_{DS} = 520\text{ V}, T_C = 125^\circ\text{C}$	--	2.0	--	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

### On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.5	--	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 5.3\text{ A}$	--	238	280	m $\Omega$

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}, f = 250\text{ KHz}$	--	789	--	pF
$C_{oss}$	Output Capacitance		--	22	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	--	--	pF

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 400\text{ V}, I_D = 5.3\text{ A}, R_G = 10\Omega, V_{GS} = 10\text{ V}$ (Note 4, 5)	--	11	--	ns
$t_r$	Turn-On Rise Time		--	10	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	49	--	ns
$t_f$	Turn-Off Fall Time		--	10	--	ns
$Q_g$	Total Gate Charge		$V_{DS} = 400\text{ V}, I_D = 5.3\text{ A}, V_{GS} = 10\text{ V}$ (Note 4, 5)	--	21.0	--
$Q_{gs}$	Gate-Source Charge	--		4.0	--	nC
$Q_{gd}$	Gate-Drain Charge	--		10.9	--	nC
$R_G$	Gate Resistance	$f = 1\text{ MHz}$		6.9		$\Omega$

### Drain-Source Diode Characteristics and Maximum Ratings

$I_S$	Maximum Continuous Drain-Source Diode Forward Current	--	--	12.5	A	
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current	--	--	37.5	A	
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 5.3\text{ A}$	--	--	1.2	V
$t_{rr}$	Reverse Recovery Time	$V_{DD} = 400\text{ V}, I_S = 5.3\text{ A}, di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	240	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	2.36	--	$\mu\text{C}$

#### Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $I_{AS} = 3\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 5.3\text{ A}, di/dt \leq 100\text{ A}/\mu\text{s}, V_{DD} \leq 400$ , Starting  $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$
5. Essentially independent of operating temperature

## Typical Characteristics

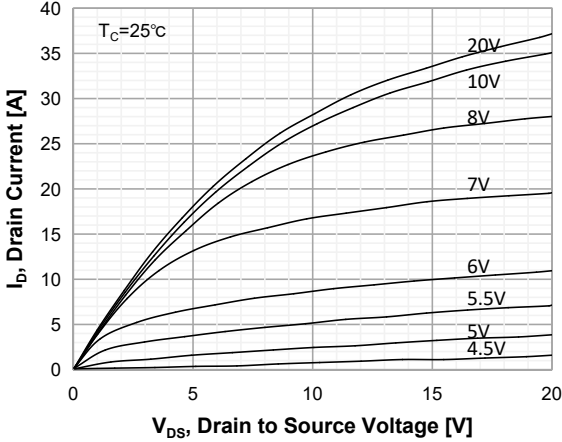


Figure 1. On-Region Characteristics

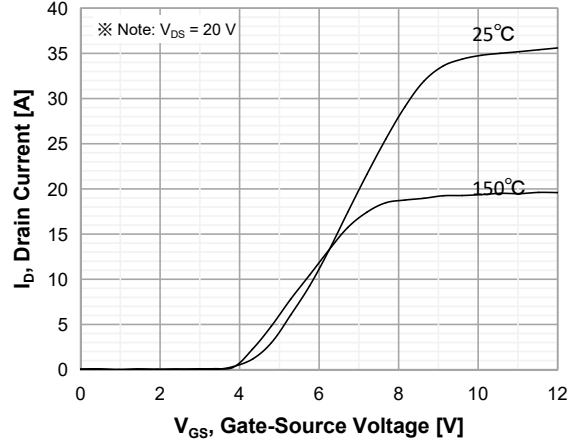


Figure 2. Transfer Characteristics

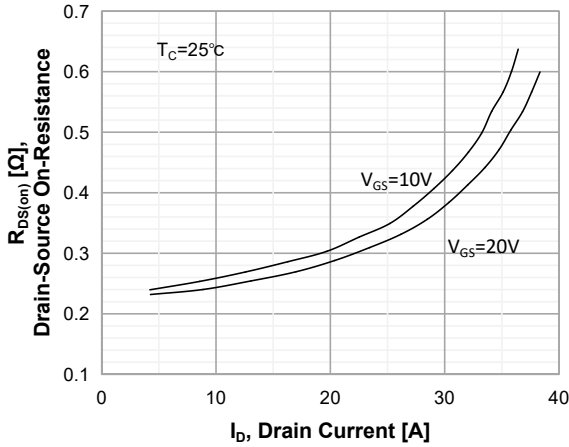


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

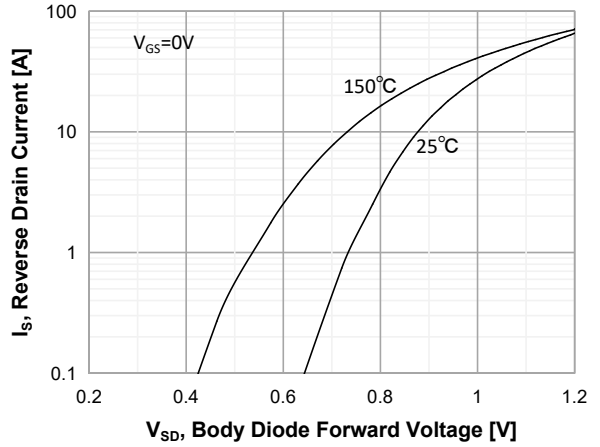


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

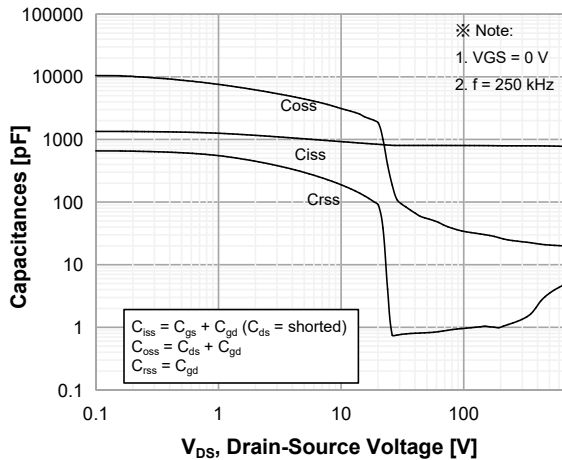


Figure 5. Capacitance Characteristics

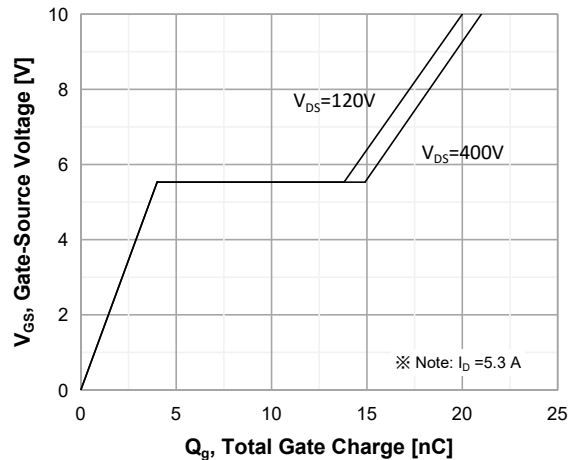


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

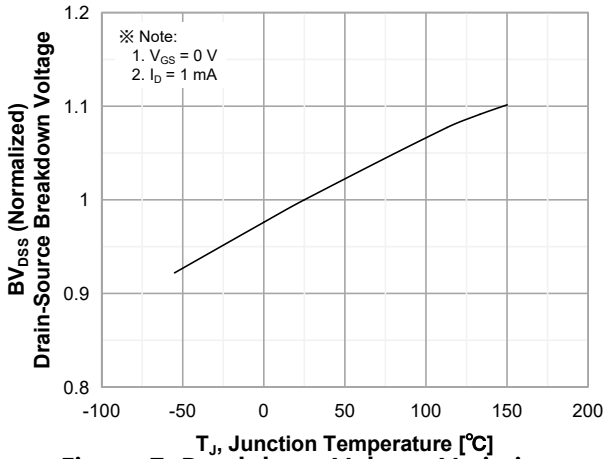


Figure 7. Breakdown Voltage Variation vs Temperature

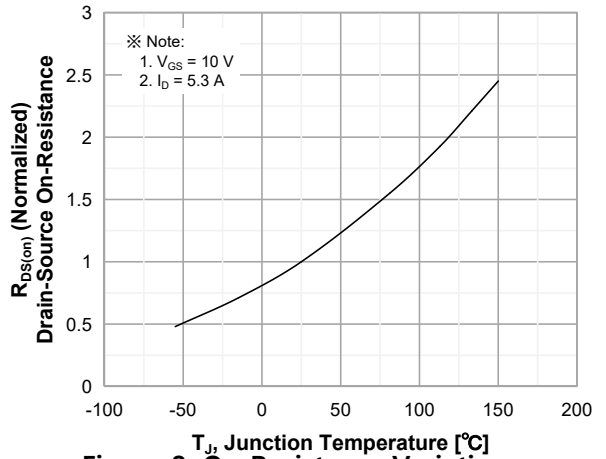


Figure 8. On-Resistance Variation vs Temperature

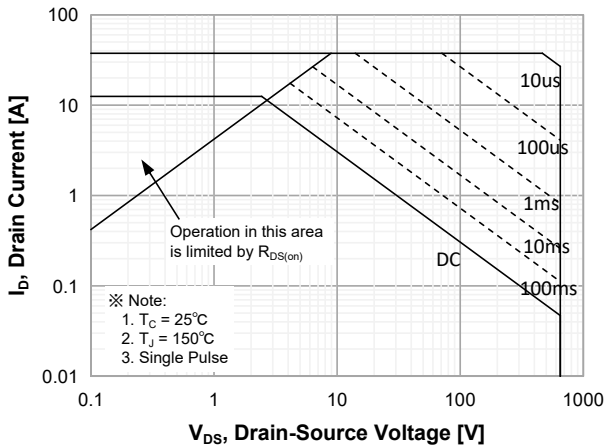


Figure 9. Maximum Safe Operating Area

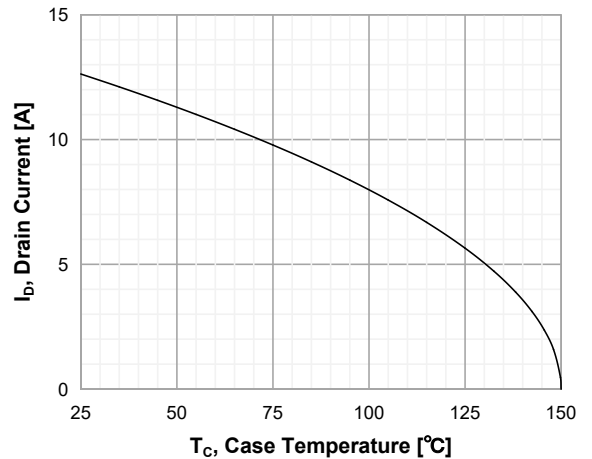


Figure 10. Maximum Drain Current vs. Case Temperature

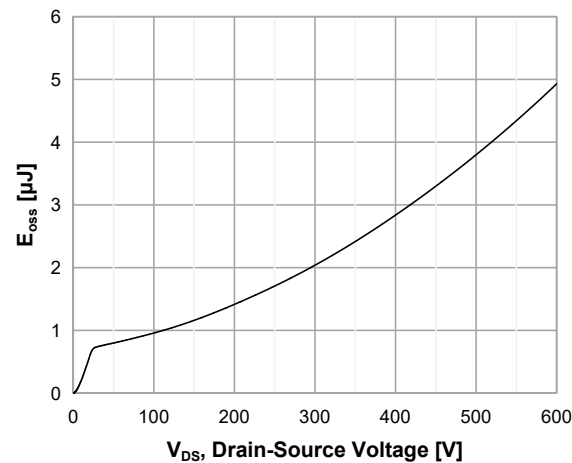


Figure 11.  $E_{oss}$  vs. Drain to Source Voltage

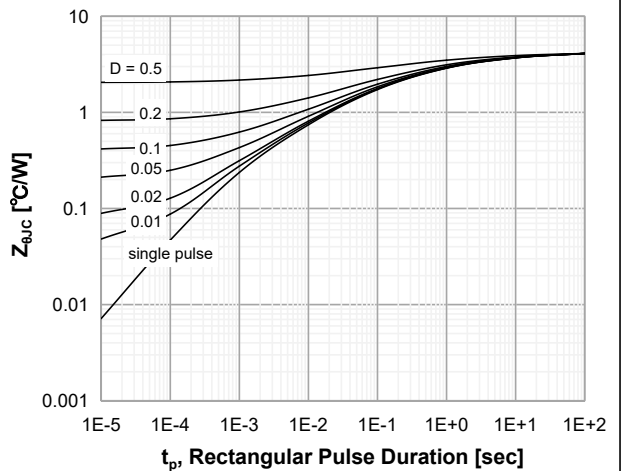
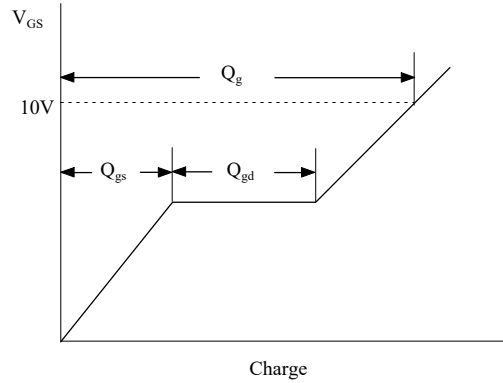
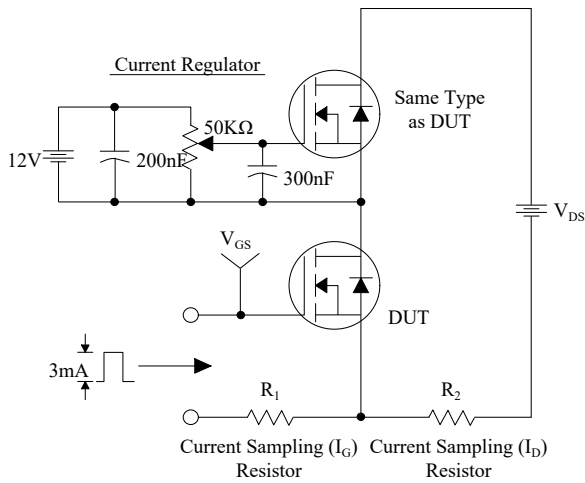
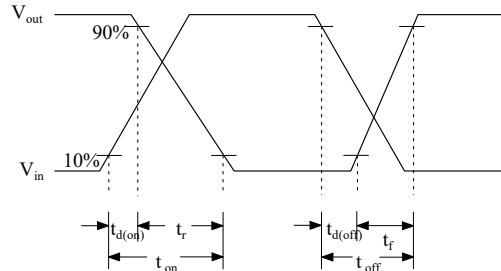
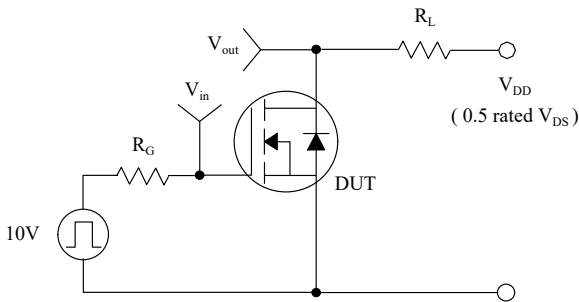


Figure 12. Transient Thermal Response Curve

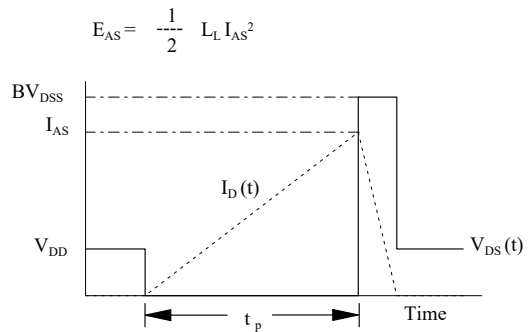
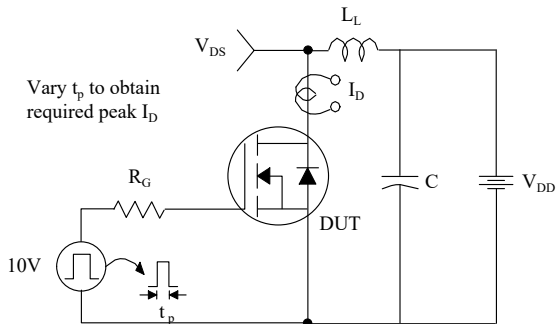
### Gate Charge Test Circuit & Waveform



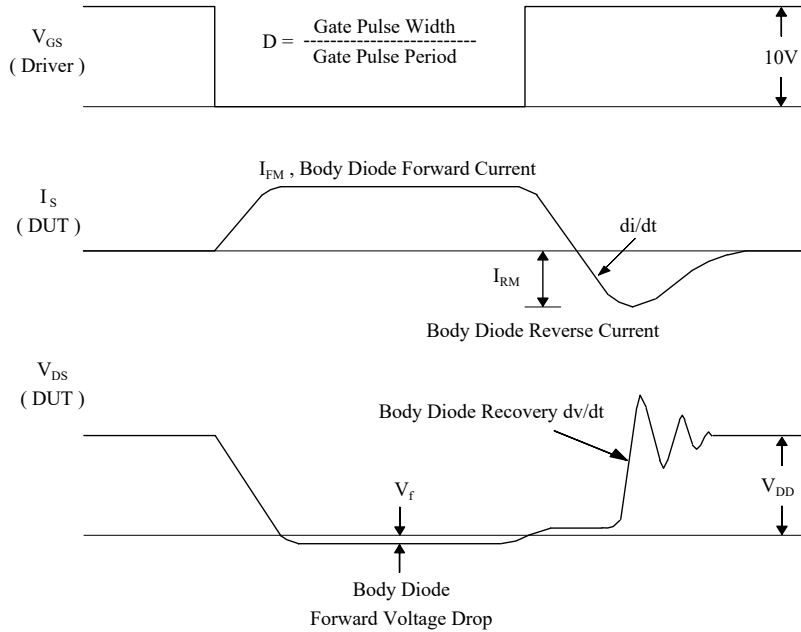
### Resistive Switching Test Circuit & Waveforms



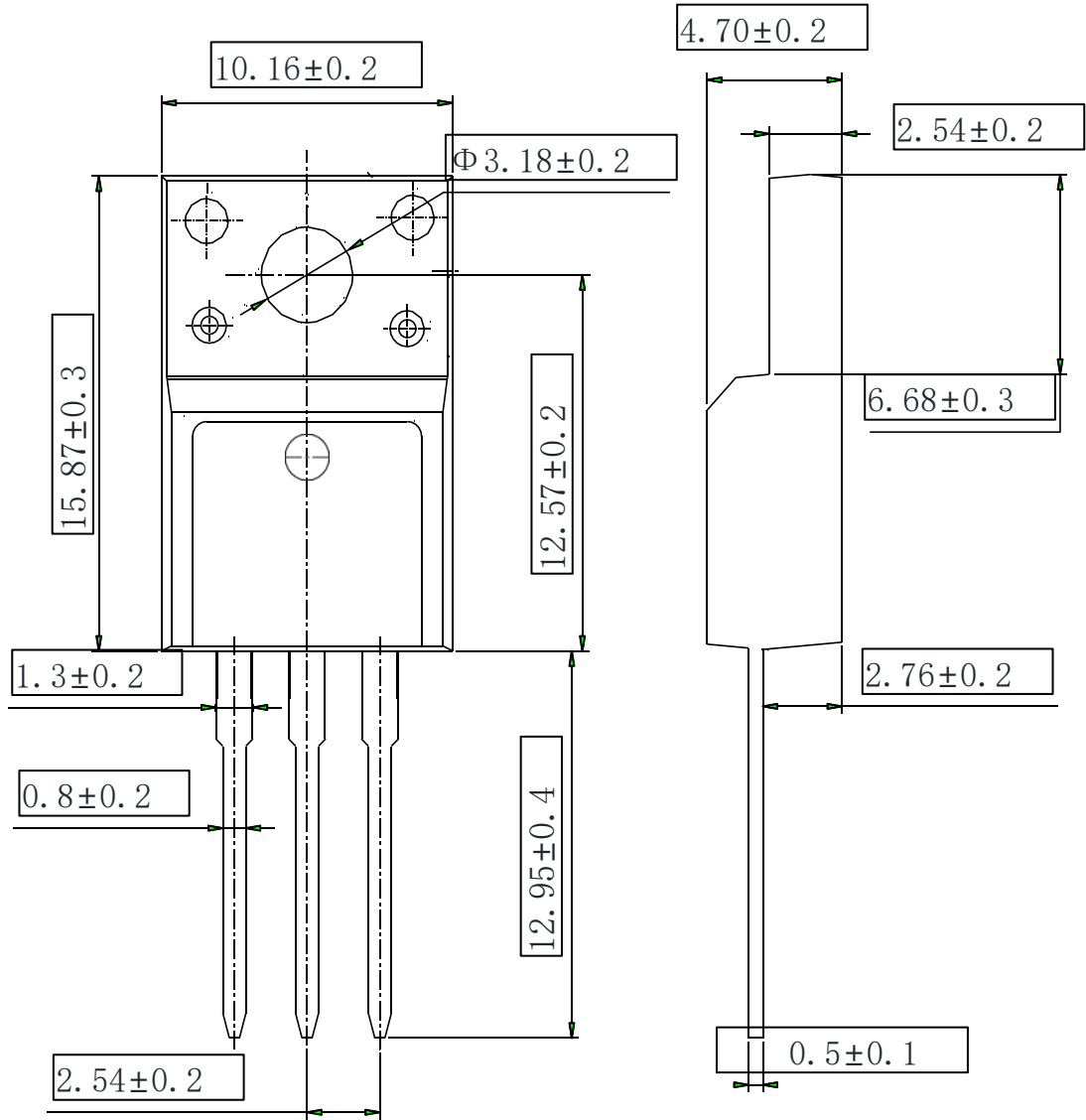
### Unclamped Inductive Switching Test Circuit & Waveforms



## Peak Diode Recovery dv/dt Test Circuit & Waveforms



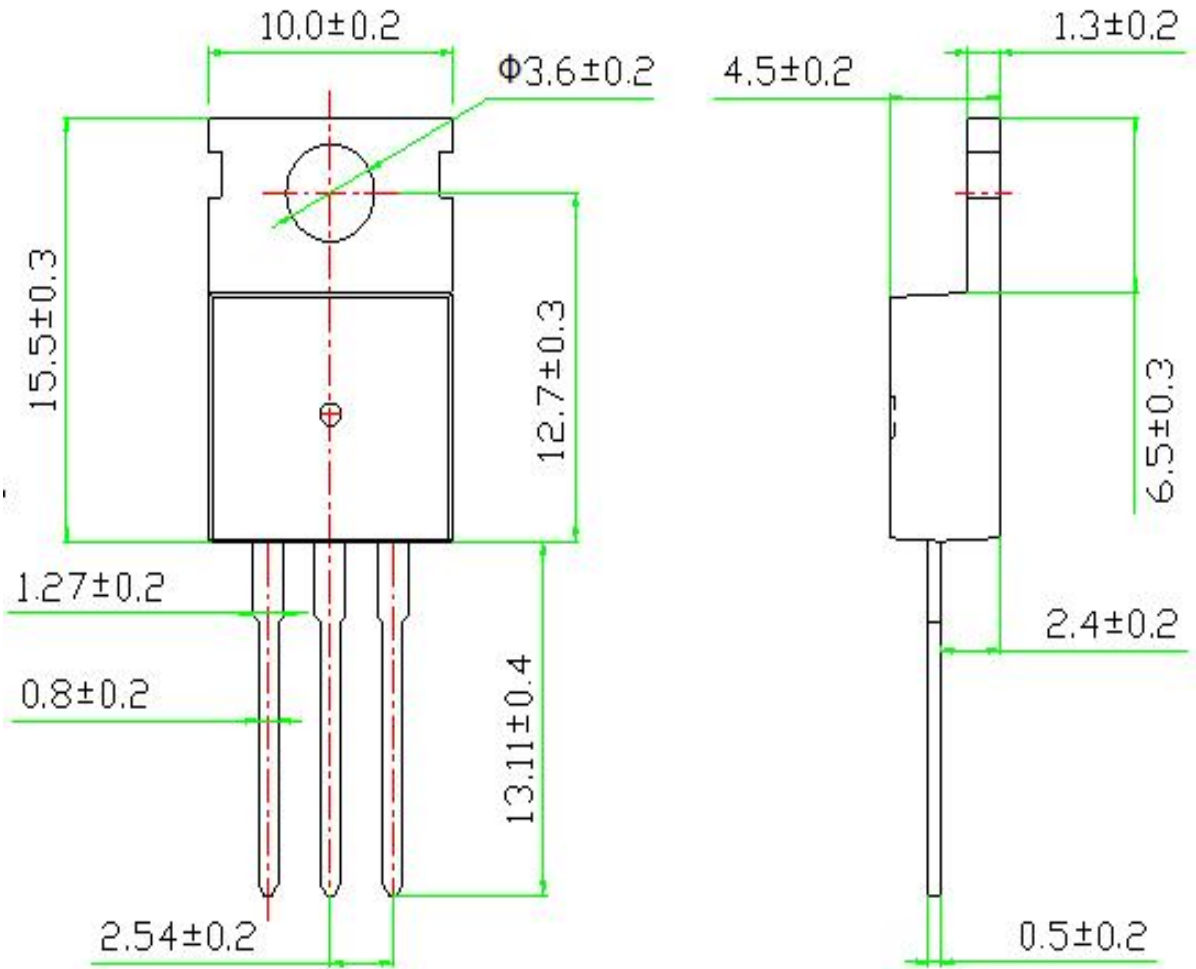
# TO-220F OUTLINE



**NOTE:**

- 1The plastic package is not marked as smooth surfaceRa=0.1;Subglossy surfaceRa=0.8
- 2.Undeclared tolerance  $\pm 0.15$ ,Unmarked filletRmax=0.25

# TO-220C OUTLINE





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